

Chemical Age

Penicillin
Breakthrough
(page 453)
O.C.C.A. Exhibition
Previewed (page 459)

VOL. 81 No. 2078

14 March 1959

MR. THERM'S LIBRARY LIST

- 1
- 2
- 3
- 4
- 5
- 6



I'm Ringelmann Zero!

You're "in the clear" with
Mr. Therm's Smokeless Coke and Gas.

For expert technical advice on Smokeless Fuel
consult your Area Gas Board.



AND - 11 million housewives cook by GAS!

Issued by the Gas Council

TALKING SHOP!

They are both research chemists but they work in widely differing fields; their requirements for laboratory chemicals are on the whole distinct. However if you asked them why they obtained their supply of laboratory chemicals from May & Baker they would give you the same answer.

They demand reliability and convenience; **M&B** brand laboratory chemicals provide just those qualities.

There are now well over six hundred laboratory chemicals in the **M&B** range. The labels on the containers give full individual specifications of the contents.

Detailed information is available on request.



**LABORATORY CHEMICALS
AND REAGENTS**



LA 467

MANUFACTURED BY MAY & BAKER LTD • DAGENHAM • TELEPHONE: DOMINION 3060 EXTENSION 320

“REDAC” PRODUCTS ACID RESISTING EARTHENWARE



Enquiries Welcomed

B. WHITAKER & SONS, LTD.

ST. STEPHENS HOUSE, WESTMINSTER

Phone: Whitehall 3616

Works: ACCRINGTON, LANCs.

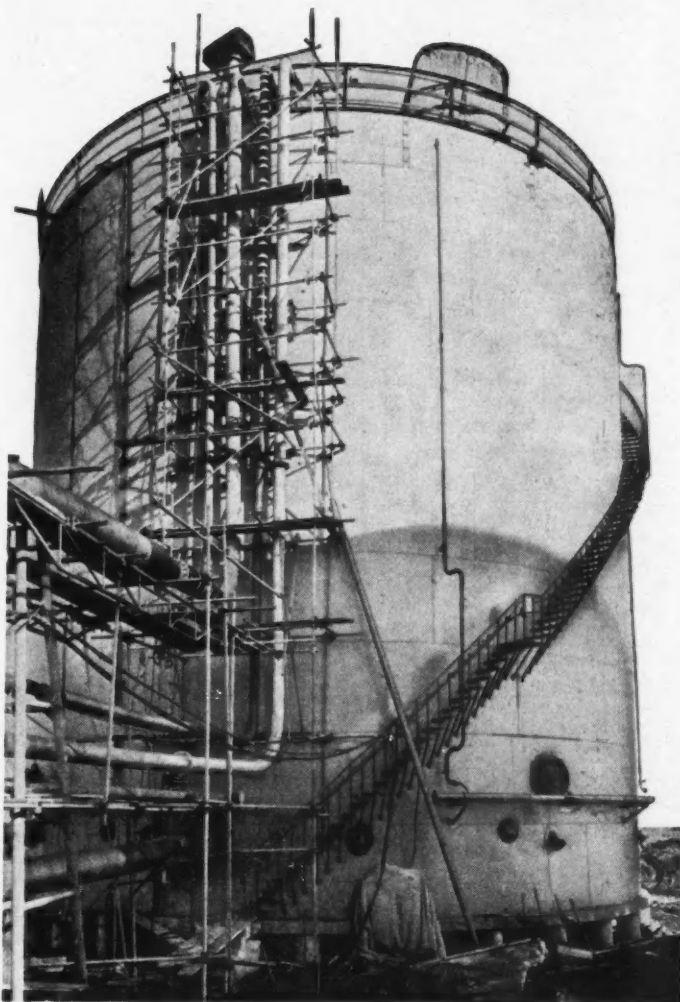
Grams: Bricavity, Parl, London

ACID RESISTING
TILES • BRICKS
ACID TOWER
PACKINGS
RINGS AND BALLS

Successfully used in

GAILLARD TOWERS • ACID OIL
SETTLING TANKS • GAS WASHERS
CHIMNEY LININGS • ASH SLUICES
HYDROCHLORIC PICKLING TANKS
ETC.

1,000 TONS LIQUID METHANE STORED AT - 260°F



The APV insulated aluminium tank at Canvey Island

One of Britain's largest aluminium tanks has been constructed at Canvey Island by The A.P.V. Company for the North Thames Gas Board as part of the Gas Council's pilot scheme for the importation of methane liquefied at -260°F . APV also constructed the 10" insulated aluminium pipeline that conveys the methane from the jetty. Together the 90,000 cubic feet tank and the 2,000 feet pipeline probably possess the greatest amount of fully radiographed aluminium welding ever undertaken in this country on site. APV were entrusted with this exacting undertaking because of their 50 years' experience in aluminium welding and tank design. APV pioneered aluminium welding in this country.

APV

Fabricators in the corrosion-resistant metals

THE A.P.V. COMPANY LTD., Manor Royal, Crawley, Sussex. Telephone: Crawley 1360. Telex: 8737. Telegrams: Anaclastic Crawley

INDEX TO ADVERTISERS

The first figures refer to advertisements in Chemical Age Directory & Who's Who, the second to the current issue

Page	Page	Page	Page	Page	Page
160 A.P.V. Co. Ltd., The	423	162 Bush, W. J., & Co. Ltd.	—	158 Elmatic	—
154 Acalor (1948) Ltd.	—	Buss Ltd.	—	Enamelled Metal Products Corporation	—
85 Accrington Brick & Tile Co. Ltd., The	—	Butterfield, W. P., Ltd.	471	(1933) Ltd.	—
African Pyrethrum Technical Information	—	Butterworths Scientific Publications	—	Engelhard Industries Ltd. (Hanovia	—
Centre Ltd.	440	126 Calder Vale Glassworks Ltd.	—	Lamps Division)	—
117 Air Trainers Link Ltd.	—	Callow Rock Lime Co. Ltd., The	—	Engelhard Industries Ltd. (Baker	—
131 Albany Engineering Co. Ltd., The	—	Cambridge University Press	—	Platinum Division)	—
Albright & Wilson (Mfg.) Ltd.	—	Cannon (CP) Ltd.	—	English Glass Co. Ltd., The	—
Alchemy Ltd.	—	Carbon Dioxide Co., The	—	G/Card Erinoid Ltd.	—
86 Alginate Industries Ltd.	—	Catterson-Smith, R. M., Ltd.	—	Evans, Joseph, & Sons (Wolverhampton)	—
100 Allen, Edgar, & Co. Ltd.	—	Causeway Reinforcement Ltd.	—	Ltd.	—
118 Allen, Frederick (Poplar) Ltd.	—	Chapman & Hall Ltd.	—	Evered & Co. Ltd.	—
Alumina Co. Ltd., The	—	Chemical Age Enquiries	485 & 486	Evershed & Vignoles Ltd.	—
Amalgamated Oxides (1939) Ltd.	—	178 Chemical Construction (G.B.) Ltd.	—	Extrudex Ltd.	—
American Cyanamid	—	Chemical & Insulating Co. Ltd., The	447		
102 Anglo-Dal Ltd.	—	106 Chemical Workers' Union	—		
Anthony, Mark & Sons Ltd.	479	Chemicals & Feeds Ltd.	—		
166 Armour Chemical Industries Ltd.	443	Chemidux Plastics Ltd.	—		
G/Card Ashmore, Benson, Pease & Co.	—	Chemitrade Ltd.	—		
Ashworth, Arthur, Ltd.	—	Christy & Norris Ltd.	—		
Associated Electrical Instruments Ltd.	—	Ciba (A.R.L.) Ltd.	427		
Turbine-Generator Division	—	110 Ciba Clayton Ltd.	—		
103 Associated Lead Mfrs. Ltd.	—	Ciech Ltd.	—		
G/Card Audley Engineering Co. Ltd.	—	City Engineering Co. (Boreham Wood) Ltd.	484		
169 Automotive Products Ltd.	—	Clark Ltd.	—		
Avo Ltd.	—	Classified Advertisements	482 & 483		
		95 Clayton, Son & Co. Ltd.	—		
Baird & Tatlock Ltd.	—	142 Clydeside Chemical Co. Ltd., The	—		
143 Baker Perkins Ltd.	—	Cochran & Co. (Annan) Ltd.	—		
Baldwin Instrument Co.	430	Cohen, George, Sons & Co. Ltd.	—		
159 Balfour, Henry, & Co. Ltd.	—	121 Cole, R. H., & Co. Ltd.	446		
Balfour Group of Companies, The	—	90 Collins Improved Firebars Ltd.	—		
120 Barclay Kellett & Co. Ltd.	—	Colt Ventilation Ltd.	431		
Bennett, H. G. & Co. (Gloves) Ltd.	—	Colvin-Smith Ltd.	—		
87 Bennett, Sons & Shears Ltd.	—	133 Comet Pump & Eng. Co. Ltd., The	—		
G/Card Berk, F. W., & Co. Ltd.	—	Constable & Co.	—		
104 Bivac Air Company Ltd.	—	Constructors, John Brown, Ltd.	—		
132 Black, B., & Son Ltd.	—	Contoura Photocopying Ltd.	—		
2 Blackman, Keith, Ltd.	—	Controlled Convection Drying Co.	448		
197 Blundell & Crompton Ltd.	—	Crofts (Engineers) Ltd.	—		
Borax & Chemicals Ltd.	—	Cromil & Piercy Ltd.	—		
84 Borax Consolidated Ltd.	—	Crosfield, Joseph, & Sons Ltd.	—		
Borer Engineering Co. Ltd.	—	99 Cruickshank, R., Ltd.	—		
4 Boulton, William, Ltd.	440	214 Curran, Edward, Engineering Ltd.	—		
97 Bourne Chemical Industries Ltd.	—	171 Cyanamid of Great Britain Ltd.	—		
Bowmans Chemicals Ltd.	—	88 Cyclope Engineering Co. Ltd., The	—		
119 & 147 Braby, Frederick, & Co. Ltd.	—	Cygnat Joinery Ltd.	—		
86 Bristol Piping Co. Ltd., The	—				
British Acheson Electrodes Ltd.	425	Dalglish, John, & Sons Ltd.	428		
British Carbo Norit Union Ltd.	447	150 Danks of Netherlton Ltd.	—		
British Ceca Co. Ltd., The	—	149 Davey & Moore Ltd.	—		
British Drug Houses Ltd., The	—	173 Davey, Paxman & Co. Ltd.	—		
British Dyewood Co. Ltd., The	—	Dawson, McDonald & Dawson Ltd.	—		
British Ermeto Corporation Ltd.	—	94 Derby Luminescents Ltd.	—		
Spine British Geon Limited	—	175 Distillers Co. Ltd., The (Chemical Div.)	—		
British Industrial Solvents	—	Distillers Co. Ltd., The (Engineering Div.)	—		
220 British LaBour Pump Co. Ltd.	—	163 Dorr-Oliver Co. Ltd.	—		
British Lead Mills Ltd.	—	139 Doulton Industrial Porcelains Ltd.	—		
Spine British Resin Products Ltd.	—	Dowlow Lime & Stone Co. Ltd., The	—		
132 British Rototherm Co. Ltd., The	—	136 Dring & Fage Ltd.	426		
89 British Steam Specialties Ltd., The	—	183 Drummond Patents Ltd.	—		
134 British Tar Products Ltd.	—	151 Dryden, T., Ltd.	438		
British Thomson-Houston Co. Ltd., The	—	Dupree Swift & Co. Ltd.	—		
231 British Titan Products Co. Ltd.	480	96 E.C.D. Ltd.	—		
267 Broadbent, Thomas, & Sons Ltd.	—	200 Electric Resistance Furnace Co. Ltd.	—		
137 Brotherhood, Peter, Ltd.	—	Electro-Chemical Engineering Co. Ltd.	—		
Brough, E. A., & Co. Ltd.	433	Electronic Switchgear (London) Ltd.	—		
101 Bryan Donkin Co. Ltd., The	—	Electrothermal Engineering Ltd.	—		
Burndept Ltd.	—	Elga Products Ltd.	—		
132 Burnett & Rolfe Ltd.	481	Elliott, H. J., Ltd.	—		

(continued on page 426)

WHY NOT LEARN MORE ABOUT...

HATHERNWARE

INDUSTRIAL CERAMIC ENGINEERS

HATHERNWARE LTD. Dept. CA7, LOUGHBOROUGH, LEICS.

Telephone: Hathern 273

PIPES AND VALVES?

The ideal medium for safety conveying and controlling corrosive chemicals

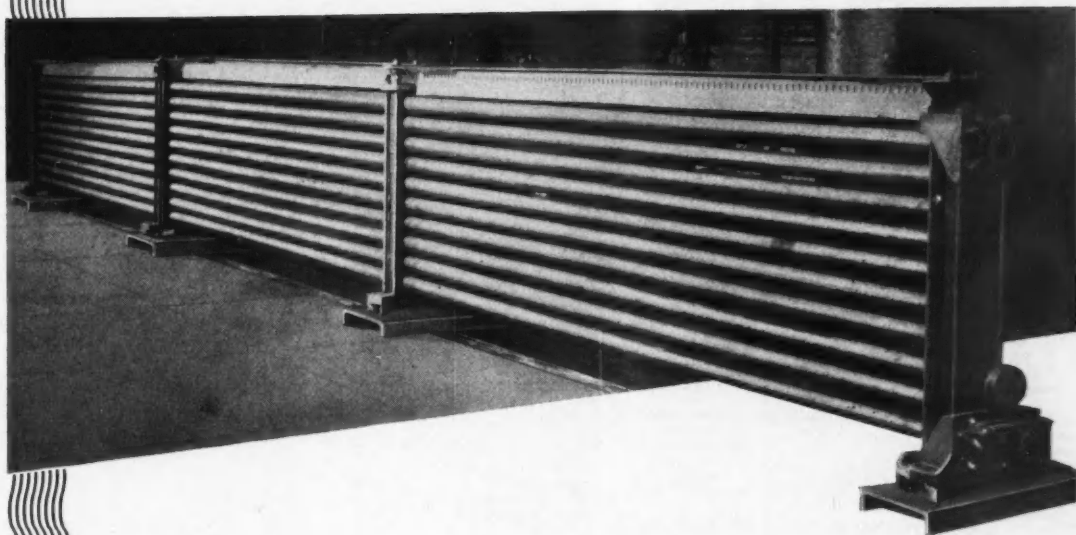
Send for further information now!



d n HL 73a

KARBATE IMPERVIOUS GRAPHITE

TRADE MARK



CASCADE COOLERS

The "Karbate" Sectional Cascade Cooler "Series CC" is a unit of greatly improved design, having several important features

and advantages over all previous units of this kind.

It is available in three models based on a 9'-0" tube length and multiples thereof. With a range of tube diameters from 1" to 4" it is possible to purchase over 200 different combinations of tube size, tube number and length. Thus any cooling requirements can be met from standard sizes. A simple "Karbate"

Mixer attachment will convert a cooler to a combined acid dilution and aftercooler unit.

KARBATE

TRADE MARK

IMPERVIOUS GRAPHITE

The term KARBATE is a registered trade mark

BRITISH ACHESON ELECTRODES LIMITED, WINCOBANK, SHEFFIELD.

PHONE : ROTHERHAM 4836

INDEX TO ADVERTISERS

The first figures refer to advertisements in Chemical Age Directory & Who's Who, the second to the current issue

Page		Page		Page		Page		Page	
127	International Furnace Equipment Co. Ltd., The	—	120	Monkton Motors Ltd.	446	—	91	Short & Mason Ltd.	—
—	Inter-science Publishers Ltd.	—	—	Monsanto Chemicals Ltd.	429	—	—	Siebe, Gorman & Co. Ltd.	—
—	Isopad Ltd.	445	—	Moritz Chemical Engineering Co. Ltd.	—	—	—	Siemens Edison Swan Ltd.	—
102	Jackson, J. G. & Crockatt Ltd.	—	—	Mulberry Co., The	—	—	—	Sifam Electrical Instrument Co. Ltd.	—
125	Jenkins, Robert, & Co. Ltd.	—	82	Neckar Water Softener Co. Ltd.	—	—	—	Simon, Richard, & Sons Ltd.	Cover iii
—	Jenkinson, W. G., Ltd.	—	115	Negretti & Zambra Ltd.	—	—	—	Sipon Products Ltd.	—
3	Jobling, James A., & Co. Ltd.	—	—	New Metals & Chemicals Ltd.	—	128	—	Southern Instruments Computer Division	—
—	Johnson, Matthew & Co. Ltd.	—	—	Newnes, George, Ltd.	—	145	—	Spencer Chapman & Messel Ltd.	—
98	Johnsons of Hendon Ltd.	—	—	Nicolson, W. B. (Scientific Instruments) Ltd.	—	—	—	Stabilag Co. Ltd., The	—
108	K.D.G. Instruments Ltd.	—	—	Nitrate Corporation of Chile Ltd.	—	266	—	Stanton Instruments Ltd.	—
148	K.W. Chemicals Ltd.	—	—	Nordac Ltd.	—	—	—	Stationery Office, Her Majesty's	—
—	Kaylene (Chemicals) Ltd.	—	146	Odoni, Alfred A. & Co. Ltd.	—	92	—	Staveley Iron & Chemical Co. Ltd.	—
—	Kellie, Robert & Sons Ltd.	434	—	G/card Oil & Colour Chemists' Association	426	—	—	Steel, J. M., & Co. Ltd.	—
—	Kellogg International Corporation	—	—	Operation Britain	—	—	—	Steel & Cowlishaw Ltd.	—
110	Kernick & Son Ltd.	—	136	Optical-Mechanical (Instruments) Ltd.	—	—	—	Stockdale Engineering Co. Ltd.	441
265	Kestner Evaporator & Engineering Co. Ltd.	—	—	Orr Products Ltd.	—	—	—	Stonehouse Paper & Bag Mills	484
—	Kestner Evaporator & Engineering Co. Ltd. (Keebush)	—	—	Palfrey, William, Ltd.	—	—	—	Streamline Filters Ltd.	—
—	Kestner (Industrial Safety) Ltd.	—	—	Pascall Engineering Co. Ltd., The	—	—	—	Sturge, John & E., Ltd.	—
130	Kier, J. L., & Co. Ltd.	—	8	Paterson Engineering Co. Ltd., The	—	15b	—	Sutcliffe Speakman & Co. Ltd.	—
—	King, G. W., Ltd.	—	161	Peabody Ltd.	—	—	—	Synthite Ltd.	—
208	Kingsley & Keith Ltd.	—	—	Penrhyn Quarries Ltd.	—	149	—	"T.P." Chemical Engineering Co. Ltd.	442
184	Kleen-eez Brush Co. Ltd., The	—	—	Permail Ltd.	—	155	—	Taylor Rustless Fittings Co. Ltd., The	—
122	Laboratory Apparatus & Glass Blowing Co.	—	194 & 235	Permutit Co. Ltd., The	—	142	—	Taylor Stainless Metals Ltd.	—
224	Lambeth & Co. (Liverpool) Ltd.	—	—	G/card Petrocarbon Developments Ltd., The	—	152	—	Thermal Syndicate Ltd., The	—
—	Langley Alloys Ltd.	—	—	Petrochemicals Ltd.	—	—	—	Thermo Plastics Ltd.	—
112	Lankro Chemicals Ltd.	—	150	Plastic Filters Ltd.	—	—	—	Thompson, John (Dudley) Ltd.	—
205	Laporte Chemicals Ltd.	—	—	Platon, G. A., Ltd.	—	120	—	Titanium Metal & Alloys Ltd.	—
114	Lavino (London) Ltd.	—	154	Podmore (Engineers) Ltd.	—	—	—	Todd Bros. (St. Helens & Widnes) Ltd.	—
173	Leda Chemicals Ltd.	—	206	Polypenco Ltd.	—	144	—	Towers, J. W., & Co. Ltd.	438
96	Leek Chemicals Ltd.	—	223	Pool, J. & F., Ltd.	—	—	—	Triangle Valve Co. Ltd.	—
—	Lees, Henry, & Co. Ltd.	—	—	Pott, Cassels & Williamson Ltd.	—	210 & 224	—	Tylors of London Ltd.	—
112	Leigh & Sons Metal Works Ltd.	—	—	Potter, F. W., & Soar Ltd.	—	—	—	Unicore Co. Ltd., The	442
—	Lennig, Charles, & Co. (Great Britain) Ltd.	—	180	Powell Duffryn Carbon Products Ltd.	—	—	—	Unifloc Ltd.	436
—	Lennox Foundry Co. Ltd.	—	—	G/card Power-Gas Corporation Ltd., The	—	—	—	Unilever Ltd.	—
129	Light, L., & Co. Ltd.	—	197	Prat-Daniel (Stammore) Ltd.	—	—	—	Union Carbide Ltd.	439
135	Lind, Peter, & Co. Ltd.	—	128	Price Stutfield & Co. Ltd.	—	—	—	United Coke & Chemicals Co. Ltd.	—
118	Liquid Solid Separations Ltd.	—	—	Price's (Bromborough) Ltd.	—	104	—	United Filters & Engineering Ltd.	—
B/cover	London Aluminium Co. Ltd., The	—	—	Prodorite Ltd.	440	—	—	G/card Universal-Matthey Products Ltd.	—
142	London Sand Blast Decorative Glass Works Ltd., The	—	190	Purkis, Williams Ltd.	—	—	—	Vacu-Blast Ltd.	—
—	Longman Green & Co. Ltd.	—	162	Pye, W. G., & Co. Ltd.	—	—	—	Vaughan Crane Co. Ltd.	—
—	Longworth Scientific Instruments Co.	—	—	Pyrometric Equipment Co. Ltd., The	—	—	—	Voss Instruments Ltd.	—
92	Lord, John L., & Son	—	—	Q.V.F. Ltd.	—	183	—	W.E.X. Traders Ltd.	—
—	Loughborough Glass Co. Ltd.	—	—	Quickfit & Quartz Ltd.	—	—	—	Walker, James, & Co. Ltd.	—
—	McCarthy, T. W., & Sons Ltd.	—	186	Reads Ltd.	—	—	—	Walker, P. M., & Co. (Halifax) Ltd.	—
—	MacLellan, George, & Co. Ltd.	449	140	Rediwell Ltd.	—	—	—	Wallach Bros. Ltd.	—
—	Maine, B. Newton Ltd.	—	—	Research Utilities Ltd.	—	105	—	Waller, George, & Son Ltd.	—
126	Manesty Machines Ltd.	—	—	Reynolds & Branson Ltd.	—	98	—	Wallis, Charles, & Sons (Sacks) Ltd.	—
177	Marchon Products Ltd.	—	—	Rheem Lysaght Ltd.	—	123	—	Ward, Thos. W., Ltd.	—
108	Matthews & Yates Ltd.	—	—	Richmond Welding Co. Ltd.	—	—	—	Warren-Morrison Ltd.	446
—	May & Baker Ltd.	Cover ii	—	Robinson, F., & Co. Ltd.	—	152	—	Watson, Laidlaw & Co. Ltd.	—
—	Measuring & Scientific Equipment Ltd.	—	—	G/card Rose, Downs & Thompson Ltd.	—	—	—	Wellington Tube Works Ltd.	—
—	Medway Paper Sacks Ltd.	—	153 & 188	Dr. Rosin Industrial Research Co. Ltd.	—	116	—	Wells, A. C., & Co. Ltd.	—
—	Mervyn Instruments & Co. Ltd.	—	124	Rotometer Manufacturing Co. Ltd.	—	220	—	Wengers Ltd.	—
Front cover	Metal Containers Ltd.	—	—	S.I.C. Plastics Ltd.	—	—	—	Whessoe Ltd.	—
—	Metallisation Co. Ltd.	—	118	S.P.E. Company Ltd.	—	—	—	Whiffen & Sons Ltd.	—
G/card	Metallcock (Britain) Ltd.	—	113	Sandiacre Screw Co. Ltd., The	—	184	—	Whitaker, B., & Sons Ltd.	Cover ii
126	Metcalf & Co.	—	—	Scientific Design Co. Inc.	—	123	—	Widnes Foundry & Engineering Co. Ltd.	—
—	Metropolitan-Vickers Electrical Co. Ltd.	—	—	Scientific Glass-Blowing Co. Ltd.	—	202	—	Wilcox, W. H., & Co. Ltd.	—
148	Middleton & Co. Ltd.	—	—	Scientific Instrument Manufacturers' Association of Great Britain Ltd.	—	136	—	Wilkinson, James, & Son Ltd.	489
—	Mills Packard Construction Co. Ltd.	—	—	Scott, Ernest, & Co. Ltd.	—	94	—	Williams & James (Engineers) Ltd.	—
—	Mine Safety Appliances Co. Ltd.	—	—	Scott, George, & Son (London) Ltd.	—	122	—	Wilson, Edward, & Son Ltd.	—
—	Mirrlees Watson Co. Ltd., The	448	—	Sharples Process Engineers Ltd.	—	114	—	Wood, Harold, & Sons Ltd.	—
140	Mirvale Chemical Co. Ltd., The	—	—	Shaw Petrie Ltd.	477	156	—	Worcester Royal Porcelain Co. Ltd., The	—
—	Mitchell, L. A., Ltd.	445	—	Shell Chemical Co. Ltd.	—	—	—	Worthington-Simpson Ltd.	—
141	Mitchell Cotts Co. Ltd.	—	193	Shell-Mex & B.P. Ltd.	—	—	—	Wynn (Valves) Ltd.	—
—	Mond Nickel Co. Ltd., The	—	—	—	—	116	—	Yorkshire Tar Distillers Ltd.	—
—	—	—	—	—	—	106	—	Zeal, G. H., Ltd.	—



Established 1725
By Appointment to the
Board of Customs & Excise

Telephones
Hop 3618
Hop 4793

Instruments for taking
Samples—Dip Rods,
Hydrometers—Glassware

DRING & FAGE LTD.
150-152 TOOLEY STREET
LONDON S.E.1

PLEASE SEND FOR OUR LATEST CATALOGUE

OIL & COLOUR CHEMISTS ASSOCIATION

ELEVENTH TECHNICAL EXHIBITION

17th 18th & 19th MARCH

R.H.S NEW HALL, GREATCOAT & ELVERTON
STREETS, LONDON, S.W.1.

INFORMATION CENTRE
STAND No 53

Cartridges and Candles



Menrow multi-purpose treatment units are equipped with filter cartridge units or candle units, according to the duties they are called upon to perform. Where cartridge units are used, all surfaces coming into contact with the liquids being filtered are coated with Araldite 985E surface coating resin, to prevent formation of metallic salts and consequent contamination. In the candle sets, the dehydration candles are also coated with Araldite which is highly repellent to water and therefore assists separation. The oil passes through the coated candles while the water remains on the surface. Araldite epoxy resin coatings are extremely tough and flexible, unaffected by moisture and chemical attack, and provide full protection against abrasion and corrosion.

Araldite epoxy resins are used

- * for bonding metals, porcelain, glass, ceramics, etc.
- * for casting high grade solid electrical insulations
- * for impregnating, potting or sealing electrical windings and components
- * for producing glass fibre laminates
- * for making patterns, models, jigs and tools
- * as fillers for sheet metal work
- * as protective coatings for metal, wood and ceramic surfaces



Photographs by courtesy of Menrow Ltd

See us on Stand 24 at the O.C.C.A. Exhibition

Araldite

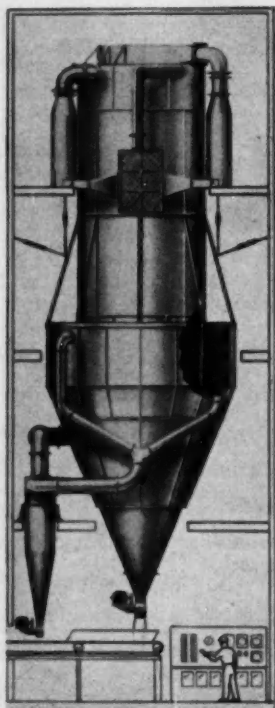
Araldite is a registered trade name

epoxy resins

CIBA (A.R.L.) LIMITED

Duxford, Cambridge. Telephone: Sawston 2121

AP410



SPRAY DRYER

DRYING MACHINES BY

DALGLISH

The world-famous Proctor Dryers are now manufactured in Great Britain by John DalGLISH & Sons, Ltd., Glasgow, who have a background of seventy-five years' experience in building Drying equipment of all kinds.

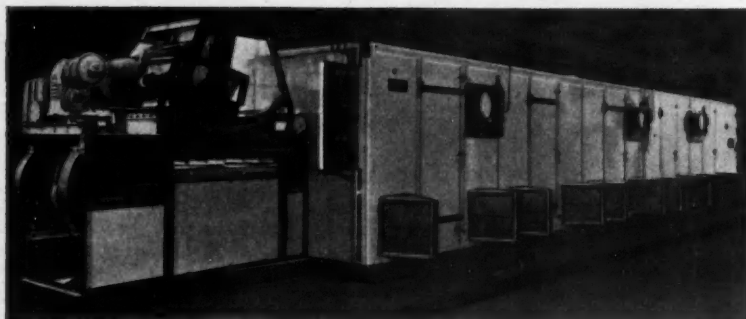
So, whether your need is a small Spray Dryer for pilot plant operation or a vast automated installation, consult the experts —DALGLISH.

Types Available

★ Truck, Tray & Tunnel Dryers. ★ Conveyor Dryers. ★ Spray Dryers with jet or spinning disc atomization.

Manufactured in Great Britain by

DALGLISH



CONVEYOR DRYER WITH ROLLING EXTRUDER FEED

JOHN DALGLISH & SONS LTD., THORNIEBANK, GLASGOW

Telephone : Giffnock 2322/5


 Monsanto


**"FOR TOP GRADE INDUSTRIAL CHEMICALS
—SEE MONSANTO FIRST!"**

Monsanto works constantly both to develop new, better chemicals—and to improve those chemicals you already use . . .

FINE CHEMICALS—Meta Cresotinic Acid, Ortho Cresotinic Acid, Technical Salicylic Acid, Sodium Phenate.

HEAVY CHEMICALS—Phenol, Meta Cresol, Phthalic Anhydride, Maleic Anhydride.

We also welcome your enquiries for the following imported products which are manufactured by Monsanto Chemical Company, U.S.A.:

para-anisidine, ortho-nitrochlorobenzene, H Acid, meta-chloraniline, Alkophos, methionine hydroxy analogue, thenylpyramine fumarate, thenylpyramine hydrochloride, succinic anhydride, ortho amino biphenyl technical, ortho-anisidine, dinitrochlorobenzene technical, ortho-nitroanisole, meta-nitrochlorobenzene.



Regd.

MONSANTO CHEMICALS LIMITED,

484 Monsanto House, Victoria Street, London, S.W.1 and at Royal Exchange, Manchester, 2.

In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Limited, Montreal. Monsanto Chemicals (Australia) Limited, Melbourne. Monsanto Chemicals of India Private Limited, Bombay. Representatives in the world's principal cities.

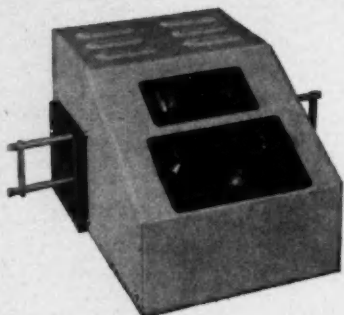
Monsanto chemicals
help industry —
to bring a
better future closer

talk **Colour** measurement and analysis with BALDWIN

2 new instruments at O.C.C.A. Exhibition

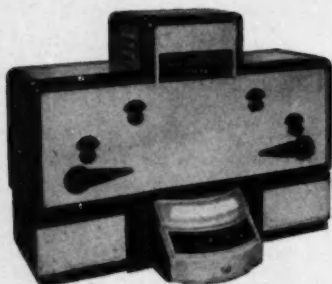
These two new Baldwin instruments measure and analyse colour by comparison with a set standard, one working with liquids, the other with solids, powders and films. Both give an instant and unmistakable reading, with accuracies of very high order. Both can be handled successfully by unskilled operators. Both maintain the Baldwin tradition of leadership in design and construction. Both are capable of very wide application in the field of process control.

The Baldwin Comparator-Densitometer



This instrument measures and analyses the colour, density and turbidity of continuously flowing liquids by simultaneous comparison with a static standard. Provision can be made for the measurement of solid samples by either transmission or reflection. It incorporates 2 photocells, an amplifier and a galvanometer calibrated 100-0-100 to give direct measurement of percentage transmission. Eight spectrum filters permit accurate selection of the waveband appropriate to the sample under measurement. Its sensitivity is such that it will detect 1 part of turbidity in 1,000,000.

The Baldwin Colormat* (Patent applied for) *Registered Trade Mark



The Colormat applies the principle of comparison-measurement of colour to solids, powders and films.

There are three models:

- Model R.** For reflection measurement of moving samples (continuous sheets, webs, etc.)
- Model S.** For reflection measurement of static samples (including powders)
- Model T.** For transmission measurement of moving samples (continuous films, translucent sheets, etc.)

Lamps may be fitted to suit the type of measurement required. The Colormat will detect a difference in colour of 0.1% and its readings are readily converted into C.I.E.

If you process or control liquids of any kind—water, beer, oils, dyes, effluents, or need to measure colour in paint pigments, paper, textiles, glass, metal film etc., you need details of these two new instruments.

Write or telephone, or better still . . .

talk **Colour** measurement and analysis with Baldwin,
on stand 74 at the O.C.C.A. Exhibition.



BALDWIN Instrument Company Limited · Dartford · Kent
Dartford 6411 A Harper Group Company.

Sales & Service facilities available throughout the U.K. and many parts of the world.



First find your fire...

... and your power and light switches and your dangerous live wires. But how—when a factory is filled with smoke and heat that can kill a man in one breath...?

Ask any Fire Chief. He will tell you: the rapid removal of smoke and heat is the key to fire fighting. It enables him to get at and put out the fire before it can spread—and with the least smoke and water damage.

Colt Dual-Purpose Fire Ventilators not only provide an automatic means of removing smoke, heat and flames, but also give excellent day-to-day working conditions. Hence their widespread adoption by industry.

For the full story of combined ventilation and fire protection write for the pamphlet "Some Aspects of Fire Prevention" by M. J. Reaney, to Dept. AZ25/3.



DUAL-PURPOSE VENTILATORS

COLT VENTILATION LTD · SURBITON · SURREY
Telephone: ELMbridge 0161 (10 lines)



See our exhibit at the Factory Equipment Exhibition, Earls Court—Stand No. G24



In spite of various prevention methods an Explosion Protection System is a necessity—it provides the ultimate in safety and will assure—

★ **CONTINUED PRODUCTION.** Should an explosion occur it will be automatically suppressed. The system can be reactivated in a very short time without damage to the process equipment. Processes can operate closer to their limits with no compromises necessary to minimize explosion-inducing conditions. Higher production rates are possible, resulting in larger profit margins and quicker return on investment.

★ **GOOD INVESTMENT.** Plant construction costs can be minimized. Extra thick walls and other prevention facilities which add to costs, can often be reduced by a sufficient amount to more than pay for the EXPLOSION PROTECTION SYSTEM. Plant insurance can be more easily obtained and rates held to a minimum with the added protection given by the EXPLOSION PROTECTION SYSTEM. Costs are not continuing. Once installed, the EXPLOSION PROTECTION SYSTEM needs attention only at normal maintenance checks. It requires an extremely small constant power source and comes complete with automatic self monitoring equipment. A vast yet hidden cost of industrial explosions is in replacement of a depreciated plant. As costs for construction rise, insurance often proves inadequate. The EXPLOSION PROTECTION SYSTEM can help prevent these catastrophes.

★ **SAFETY.** Personnel safety is, naturally, a major by-product of the EXPLOSION PROTECTION SYSTEM. Conversely, the system is a safety precaution against human error.

Protection is constant. The EXPLOSION PROTECTION SYSTEM cannot, once made operative, be inactivated without knowledge.

GRAVINER

MANUFACTURING COMPANY LIMITED
Fareham Road · Gosport · Hants · Fareham 2511
St. James's Street · London SW1 · WH1 6478

Specialists in Industrial Thermostats, Overheat Switches and Airborne Fire Protection Equipment.

★ Please send me a copy of your brochure "Industrial Explosion and Suppression in Industry".

★ Please ask your representative to make an appointment to see me.

★ Delete one of above if inappropriate.

Name.....

Position.....

Company Address.....

CUT OUT AND POST TODAY



LET BROUGH'S KEEP ON TOP OF YOUR PACKAGING PROBLEMS!

There's a BROUGH'S DRUM for every purpose and they are used by leading industries throughout the world.

May we quote you for your requirements?



E. A. BROUGH & CO. LTD. UPPER PARLIAMENT ST. LIVERPOOL 8 AND AT SPEKE
Phone: ROYal 3031-3. Grams: SUPERDRUM LIVERPOOL 8

Kellie

All purpose Autoclave



**FOR PROCESSING WITH STEAM
AND COMPRESSED AIR
OR
STEAM AND VACUUM ARRANGEMENTS**

No steam jacket is employed, and there is no local overheating.

Processing is by patent steam heated Revolving Calandria, which incorporates a Swash Plate Impeller.

The rotating movement of the Calandria continually cleans the heating elements.

The ratio of the rotating heating surface to volume is 50 per cent greater than that of a steam jacketed autoclave.

Here is an Autoclave which is designed to supersede the steam jacketed vessels of all types from the viewpoint of economy and efficiency.

**For Special Purpose and Processing
Plant . . . Consult**

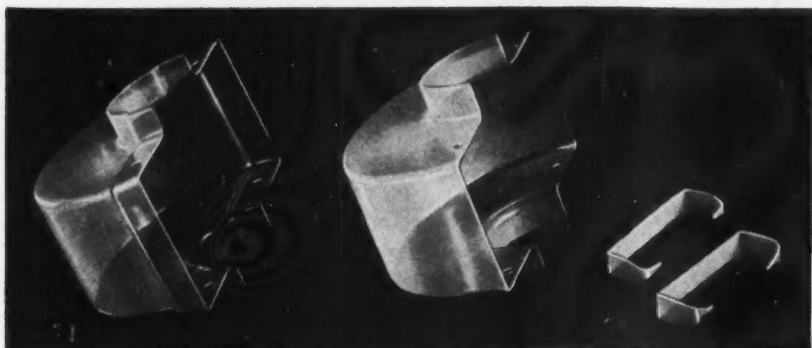
KELLIE

Write today for further particulars to:

ROBERT KELLIE & SON LIMITED DUNDEE SCOTLAND

Telephone: Dundee 2819 (2 lines)

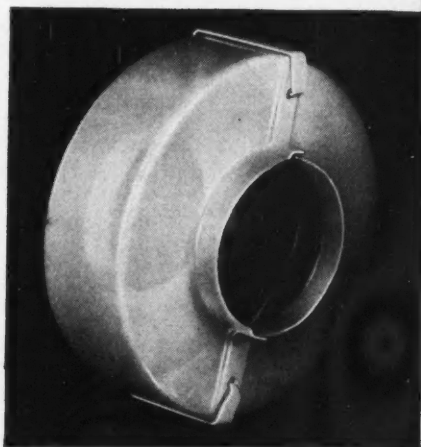
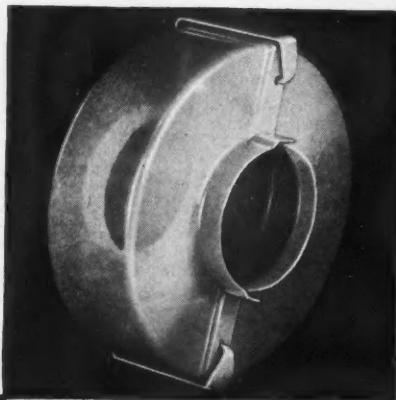
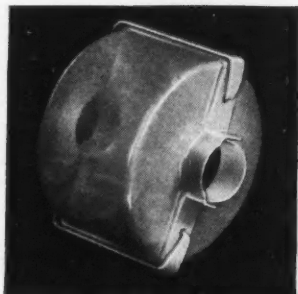
Telegraphic and Cable address: "Kellie" Dundee • Code A.B.C. (5th Edn).



Corrosion-resistant 'Darvic' protects chemical plant



'Darvic' p.v.c. flange covers for chemical plants made by Industrial & Marine Protective Applications Ltd.



THESE FLANGE COVERS for chemical plant were made from 'Darvic' p.v.c. sheet. The manufacturers chose 'Darvic' for a number of reasons. The most vital is its superior resistance to a wide range of chemicals. This outstanding chemical resistance is allied to high impact strength and light weight. 'Darvic' is easy to shape, has considerable rigidity even in thin sheets and dimensional stability in atmospheres of varying humidity. For these reasons it has a wealth of applications in the chemical and other industries. 'Darvic' is available in a wide range of colours and in multi-colour laminates.

'Darvic' is the registered trade mark for the rigid p.v.c. sheet made by I.C.I.

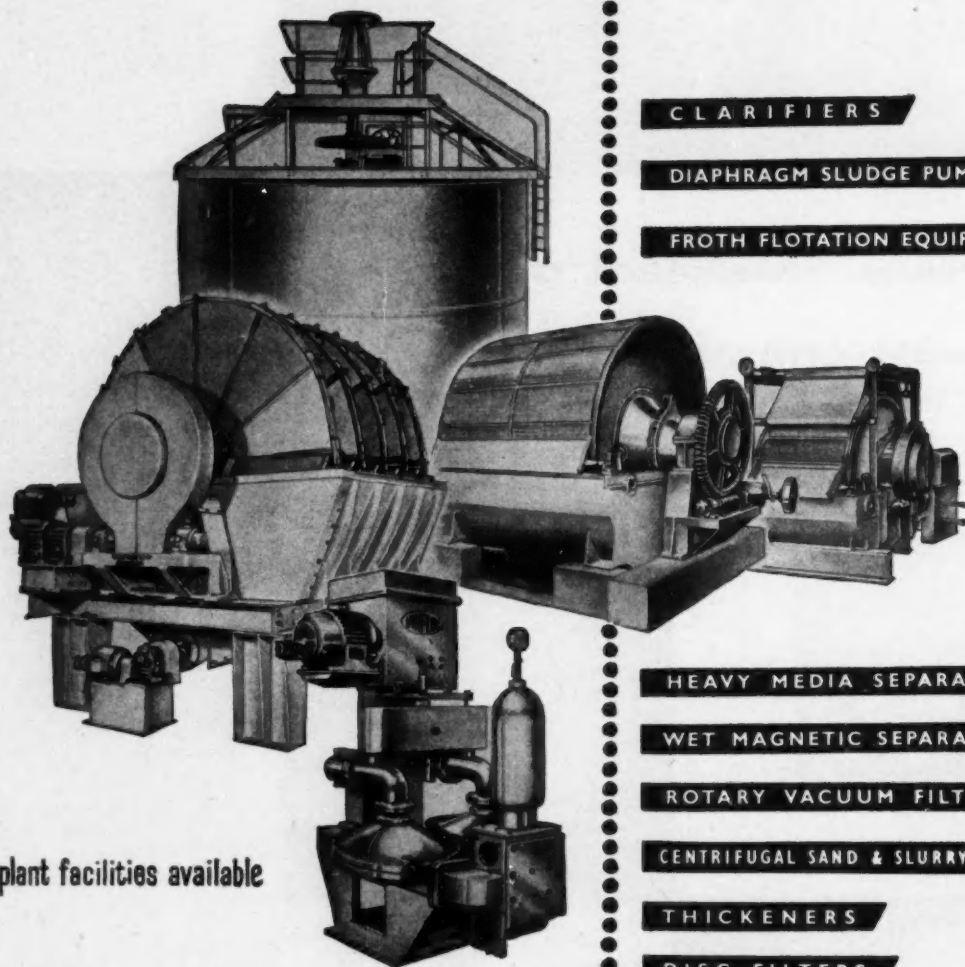
'DARVIC'



IMPERIAL CHEMICAL INDUSTRIES LIMITED • LONDON • S.W.1

FD.48

Plant for wet material handling



Test plant facilities available

CLARIFIERS

DIAPHRAGM SLUDGE PUMPS

FROTH FLOTATION EQUIPMENT

HEAVY MEDIA SEPARATORS

WET MAGNETIC SEPARATORS

ROTARY VACUUM FILTERS

CENTRIFUGAL SAND & SLURRY PUMPS

THICKENERS

DISC FILTERS

unifloc plant

*Better temperature
measurement & transmission with the new*

FOXBORO
M12A Pneumatic
TEMPERATURE TRANSMITTER



- ★ STABLE IN OPERATION
- ★ HIGH IN ACCURACY
- ★ FAST IN RESPONSE
- ★ VERSATILE IN APPLICATION

FOXBORO-YOXALL LIMITED

REDHILL

SURREY

ENGLAND

REDHILL 5000

T. DRYDEN LTD.

THE SOUTH WALES LABORATORY FURNISHERS

LANDORE - SWANSEA

ACIDS and CHEMICALS for SCIENTIFIC and INDUSTRIAL PURPOSES

SCIENTIFIC GLASSWARE and APPARATUS
BALANCES, MICROSCOPES, etc.

"ANALAR" CHEMICALS and ACIDS

"E-MIL" VOLUMETRIC GLASSWARE and THERMOMETERS

HIGH CLASS LABORATORY FURNITURE

PHOTOGRAPHIC CHEMICALS and EQUIPMENT

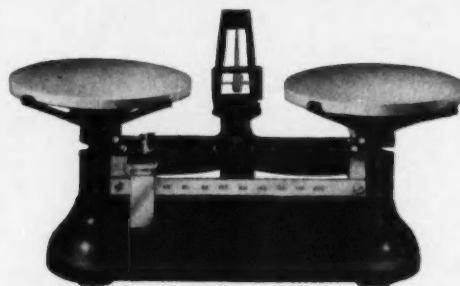
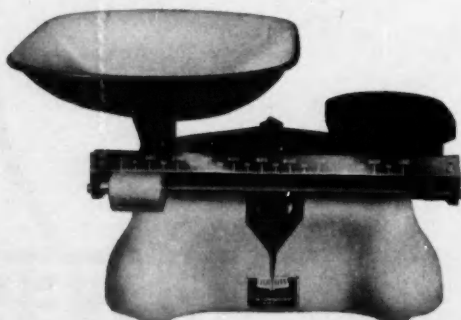
TELEPHONE

SWANSEA 55844/5

TOWERS QUICK-WEIGHING BALANCES

SLIDING - WEIGHT BALANCE. Model 5.
Capacity 2 kilos, sensitivity 0.1 grm. Fitted with 2
scales, one 0-10g. in 0.1g., and the other 0-200g. in
10g. Various types of pan available.

Over 12,000 in use.



ROTATING - WEIGHT BALANCE. Model 7.
Capacity 6 kilos, sensitivity 0.5g. Scale 0-1000g. and
rotating weight reading to 0.5g.

Weights under 1 kilo not required. Made with scoop
pan (illustrated), flat pan or animal cage.

May we send you full details of the above balances?

J. W. TOWERS & CO., LTD.

Head Office and Works: WIDNES, Lancs. (Widnes 2201. Telex 62183)

Manchester:
44 Chapel Street, Salford 3
(Blackfriars 2677)

Liverpool:
134 Brownlow Hill
(Royal 4074)

Stockton:
28 Bridge Road
(Tel. 65141)
Telex 58543

London:
Industrial Estate Uxbridge
(Uxbridge 8461)
Telex 24411



SERVING YOU WITH MORE THAN 500 SYNTHETIC ORGANIC CHEMICALS

Your key to leadership in new markets is on the UNION CARBIDE* list of over five-hundred synthetic organic chemicals. UNION CARBIDE* has developed more than one chemical per month on the average during the past twenty-five years and the experience of this background is at your service in the nature of technical assistance combined with prompt and efficient delivery.

Alcohols · Aldehydes · Anhydrides · Aryl and Pyridine Type Compounds · CARBOWAX* Polyethylene Glycols · CELLOSIZE*
 Hydroxyethyl Cellulose · CELLOSOLVE* and CARBITOL* Glycol-Ethers · CRAG* Agricultural Chemicals · Ethers and Oxides ·
 Ethanolamines · Glycols and Triols · Ketones · NIAX* Polypropylene Glycols · Polyamines · TERGITOL* Surface-Active Agents ·
 UCON* Fluids and Lubricants · Vinyl Esters and Ethers. *Trade Marks of UNION CARBIDE CORPORATION

CHEMICALS DIVISION

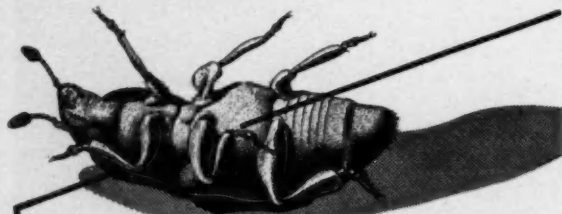
UNION CARBIDE LIMITED

103 Mount Street, London, W.1.

Telephone HYDe Park 5361

Only African Pyrethrum . . .

Of all insecticides there is only one—African Pyrethrum—to which insects have shown no resistance of any practical significance



You will of course recognise the importance of this fact. But African Pyrethrum has one other overwhelming advantage—both from the manufacturer's and user's point of view. African Pyrethrum can be used with a synergist or with other insecticides and still retain its properties. This means that it is as economical in its use as most others. Further information regarding the many advantages of African Pyrethrum—its knockdown property, non-toxicity to mammals, etc.—and its many applications can be obtained from—

AFRICAN PYRETHRUM

AFRICAN PYRETHRUM TECHNICAL INFORMATION CENTRE LTD
4 Grafton Street, London W.1 Telephone: HYDe Park 0521

SAFE AND QUICK



REG. DESIGN
No. 886,485
Patent Pending
Officially approved
by H.M. Factory
Inspectorate,
Industrial Health
& Safety Centre.

**for breaking
pipe flanges
or any bolted
flange joint**

FLANGE SPREADER

For quicker breaking of joints saving valuable time of skilled workmen. Safer than wedges or chisels—no danger of wedges flying, explosion or fire due to sparks. Can be used in confined spaces and will not damage the faces of flanges.

FOR BREAKING RING JOINT FLANGES, USE THE SPECIAL BLUNT WEDGE TYPE.

BORER ENGINEERING CO.
54, Park Lane, Croydon, Surrey. (CROydon 9366)

For more information use Enquiry Form—CP Ref.

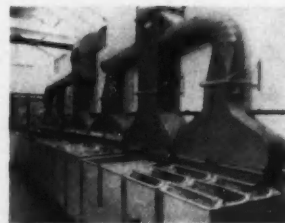
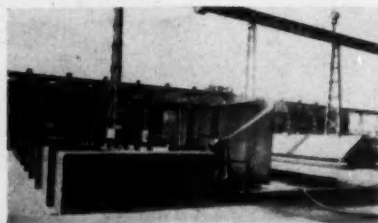
WHEN IT'S A QUESTION OF CORROSION

CONSULT THE SPECIALISTS

PRODORITE
LTD

WE SPECIALISE IN THE DESIGN AND CONSTRUCTION OF

- ★ ACID-PROOF TANKS, LININGS AND FLOOR SURFACES
- ★ CORROSIVE FUME EXTRACTION SCHEMES IN P.V.C AND ORGLAS
- ★ TRADE EFFLUENT TREATMENT AND NEUTRALISING SCHEMES
- ★ MANUFACTURERS OF A COMPLETE RANGE OF CORROSION RESISTING CEMENTS



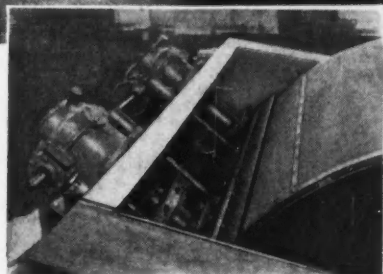
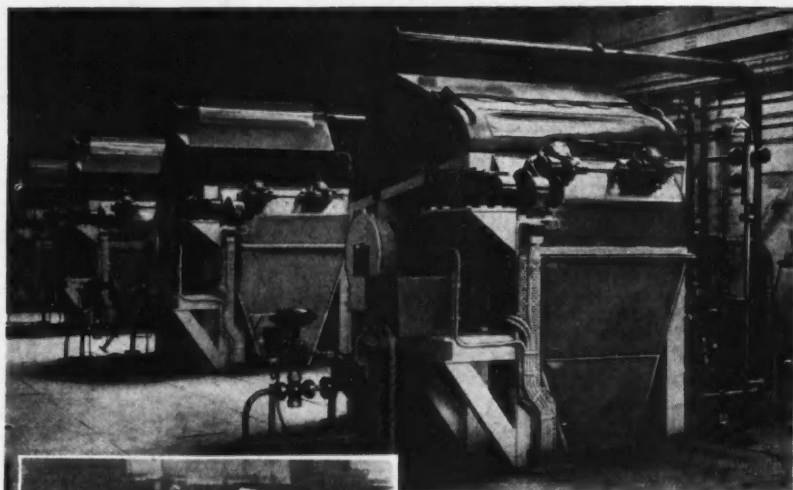
EAGLE WORKS · WEDNESBURY · STAFFS.
TELEPHONE WED 1821 (9 LINES)


STOCKDALE
**CHEMICAL
ENGINEERING**

NEWS

READ BY CHEMICAL AND PROCESS ENGINEERS EVERYWHERE. No. 6

STOCKDALE + PRECOAT = CLARITY



We are proud of this fine installation of Stockdale Precoat Filters. These units were designed to handle a difficult filtration in one of Britain's newest and most progressive industries. The advancing knife shaves off a layer of controlled thickness from the preformed filter bed presenting a fresh filtration surface and maintaining maximum rate without loss of filtrate clarity.

Liquids containing fine slimes can be clarified at high rates with minimum consumption of filter aid by this technique.

UK MIXERS CUT COSTS

In order to match the high efficiency and low maintenance costs of the UK Mixer Drive Units, Stockdale's UK Mixer Division is constantly applying special materials to combat the wide variety of corrosive, abrasive and erosive conditions encountered in fluid mixing equipment. In addition to agitators in mild and stainless steel, recent deliveries include the following examples:- Coros alloy DU, Stel alloy B, Nionel, Monel, Bronze, as well as agitator assemblies covered with glass, rubber, PVC and lead.

APPOINTMENT

G. H. Duffield, A.M.I.Mech.E. appointed Director on 1st January 1959. We know that George Duffield is already well known to a great many readers of our News Sheet. He has been responsible for the successful application of a wide variety of Chemical Plant in many industries.

With his specialist knowledge in the fields of evaporation, heat transfer and separation, he will further strengthen the Stockdale Technical Team.

ANGLO-AMERICAN AGREEMENT

Stockdale's representation in Europe of Podbielniak Incorporated was initiated by the visit of Dr. Collin Doyle, Podbielniak's General Manager in the middle of last year. In further support of our efforts to give to users and potential users of Podbielniak equipment a sound technical service, we enjoyed a recent visit from Mr. Kaiser, Podbielniak's Vice President, and Mr. Baker, their senior Mechanical Engineer.

Our next News Sheet will contain some interesting notes on the wide range of high quality equipment we are now supplying for Podbielniak.

Information
required
on:

Impellers ☐

Filters ☐

Valves ☐

STOCKDALE ENGINEERING LTD., POYNTON, CHESHIRE. Tel. Poynton 2601

Please send complete data concerning

Name

Company

Address

Position G6

dm SC 99

REPEAT ORDERS FOR ROTARY VACUUM FILTERS

Messrs. Kemball Bishop & Co. Ltd. have recently specified Stockdale Filtration Equipment for effluent treatment in their Millwall plant. The new filter will be a String Discharge rotary vacuum unit and has been selected as a result of several years' operation with Stockdale Filters.

Repeat orders of this nature indicate a maintained preference for Stockdale equipment and an appreciation of the Stockdale Filtration Division service. Consult our Filtration Division with your Filtration problem.



12" ALL PURPOSE PINCH VALVE

In our Fifth News Sheet, we illustrated our new Flush Bottom Discharge Valve. Continued developments by our Valve Division enable us to show an improved design of the 12" "Stelco" Pinch Valve in this issue. These are now being supplied for use in chemical works, ore milling plants, cement works, tanneries and industrial plants — wherever it is necessary to transport abrasive and corrosive slurries, pulps or liquids. The sleeve or foot of the "Stelco" Pinch Valve is made from moulded rubber, neoprene or other synthetic compounds to meet special requirements of corrosion resistance.



MODEL 1632 MS
Prov. Pat. No. 12566/58

THE "TP" POWDER BLENDER

SEEMS IMPOSSIBLE!!!

CAN'T BE TRUE!!!

INCREDIBLE!!!

UNBELIEVABLE!!!

COULDN'T TIME IT IN MINUTES

IT WAS ONLY SECONDS!!!

Are some of the comments heard when people first learn of the amazing performance of the

"TP" POWDER BLENDER

Critically tested and proved the best in every respect for perfect blending. Plastic moulding powders (dry colouring in 5 minutes). Pottery aggregates. Pharmaceutical chemicals. Pigments, Foods, etc., etc. Everywhere where there are powders to be blended.

Detachable Vessel • Built-in hand-turning device
Built-in starter and 5 amp. three-pin socket

Easily Cleaned.

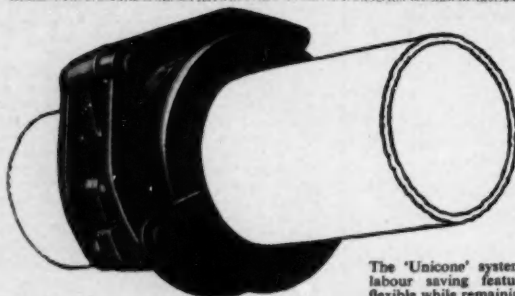
ENGINEER DESIGNED ENGINEER BUILT

ASK FOR DEMONSTRATION

T-P CHEMICAL ENGINEERING CO., LTD.

5 THORNHILL ROAD • CROYDON • Tel. THORnton Heath 1708

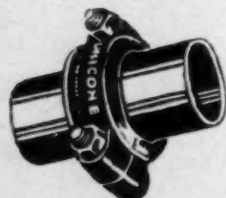
INSTANTANEOUS! JOINTS



*Leakproof.
safe . . .
reliable!*

The 'Unicone' system of pipe-jointing, with its time and labour saving features, produces a pipe-line which is flexible while remaining absolutely leak-proof.

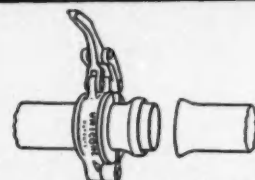
For temporary pipelines 'Unicone' instantaneous joints are recommended. These joints require no tools of any kind, comprise two parts only and fasten with a 'snap' ensuring a perfect seal in a matter of seconds.



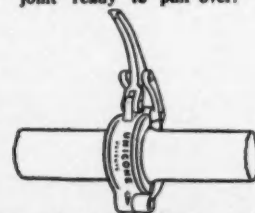
For permanent or semi-permanent pipe-lines 'UNICONE' bolted pipe joints are employed



THE UNICONE CO., LIMITED
RUTHERGLEN, GLASGOW, SCOTLAND



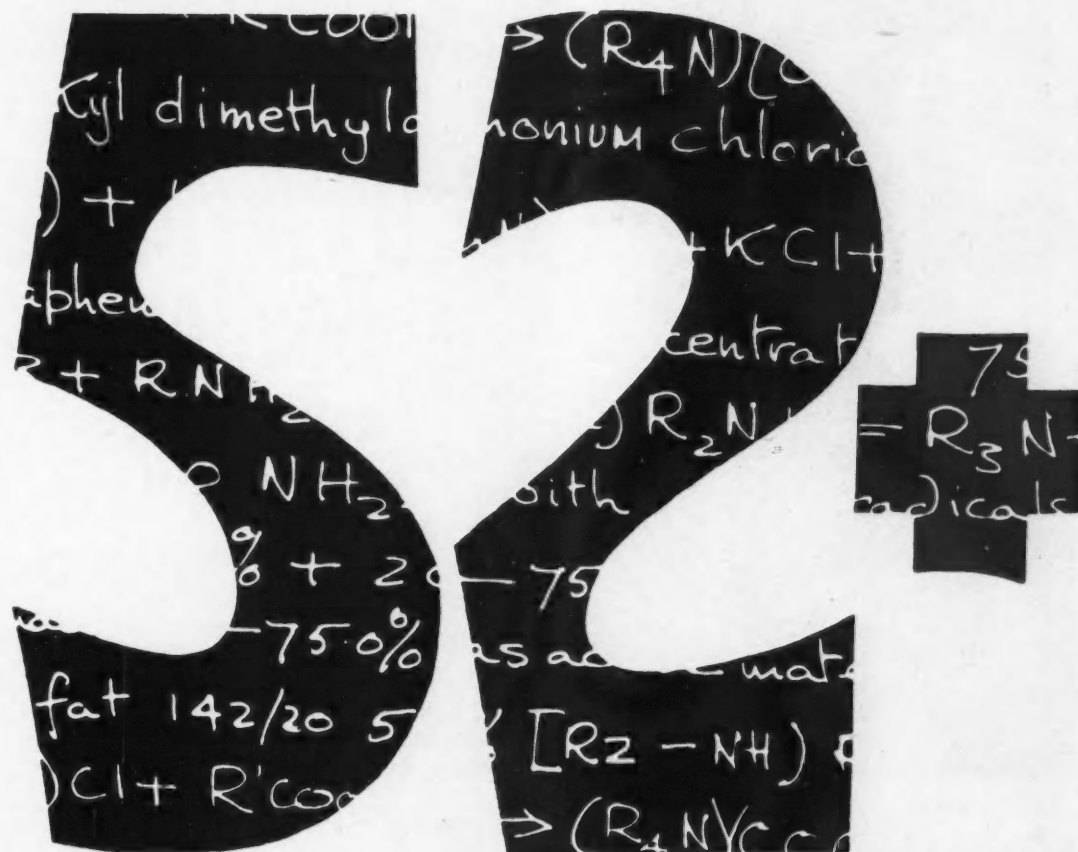
Rubber gasket in position and joint ready to pull over.



Pipe ends joined ready for locking.



The completed joint.



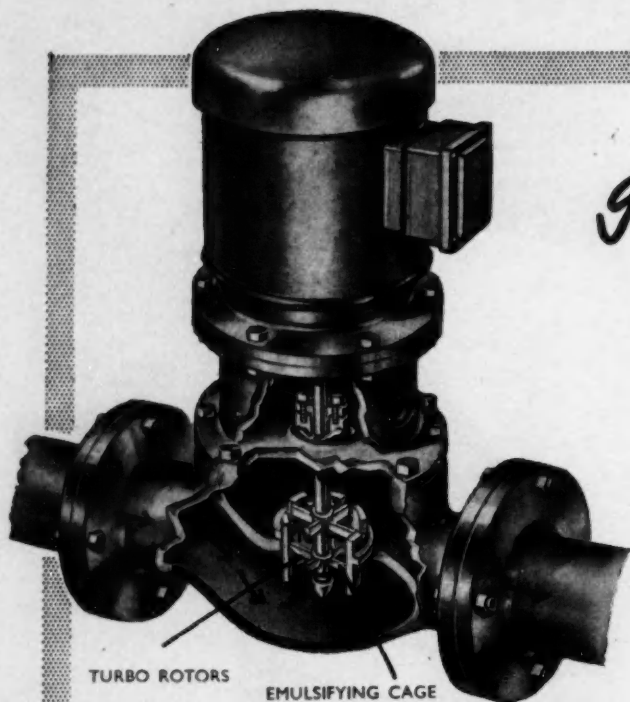
Since production of Armour Chemicals began in the United Kingdom in the Spring of 1956, new Armour Chemicals have come from the plant at the rate of one every $2\frac{1}{2}$ weeks. By the Autumn of 1958 there were 52 chemicals in regular production—and more are constantly being added. The latest newcomers are the ETHOMEENS, which are tertiary amines with a nonionic structure. Others are such cationic products as aliphatic amines (ARMEENS), diamines (DUOMEENS), their water soluble acetate salts (ARMACS, DUOMACS), and quaternaries (ARQUADS), and the amphoteric ARMEEN Z series.

There is virtually no industry in which these surface-active substances are not in use, or in which they have not a potential use. No matter what your interest, it will pay you to study our informative booklets, available to you free on request.



ARMOUR CHEMICAL INDUSTRIES LTD

4 CHISWELL STREET, FINSBURY SQUARE, LONDON, E.C.1. METROPOLITAN 0031



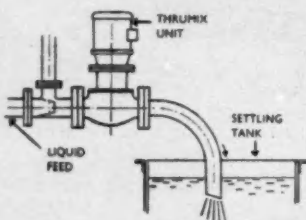
Introducing the

Boulton CONTINUOUS PIPE LINE MIXER

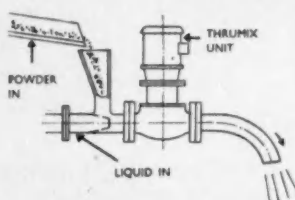
THRUMIX

Instead of mixing large volumes of liquids in a vessel, with consequently high power consumption, it is now possible to mix continuously IN THE PIPELINE with the Thrumix Continuous Mixer.

Advantages: • IMMEDIATE MIXING • EASE OF INSTALLATION • NEGLIGIBLE MAINTENANCE • POWER ECONOMY

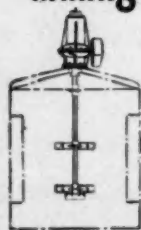


Two or more Liquids continuously mixed. This arrangement is used where 'Washing' of a liquor is necessary with subsequent settling.



Liquid/Powder continuously mixed or dissolved. Vibrator powder feeder is a useful means of adding powder.

Mixing and blending equipment



For full details of
The THRUMIX
send for booklet
to:

In common with most industries mixing and blending in recent years has seen steady advance in technical design. Equipment has reached a high degree of specialisation and efficiency with a wide range of specifications to suit different processes. With these facts in mind Wm. Boulton Ltd., offer this booklet as a comprehensive guide to engineers and executives faced with the problem of selecting plant.

Send for this free booklet.



BALL MILLS



FILTER PRESSES



GYRATORY SCREENS

Boulton

WILLIAM BOULTON LIMITED

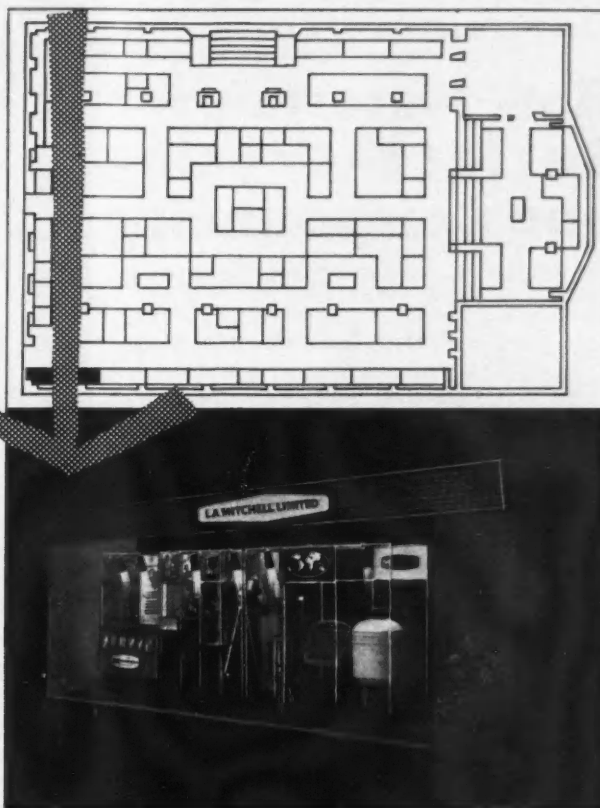
Come and see us at Stand no.70

O.C.C.A. EXHIBITION

We are exhibiting several items from our comprehensive range of Fluid Agitating Equipment for oils, chemicals, paints, varnish, etc. Also sparkler horizontal plate filters for clarifying lube oils, waxes, edible oils, resins, varnish, lacquers etc.



L. A. MITCHELL LTD. HARVESTER HOUSE,
37 PETER STREET, MANCHESTER.



ISOMANTLES

*for glass flasks and
columns*

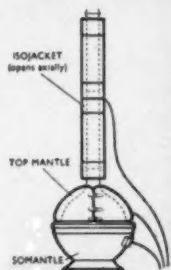


Isomantles are made for glass flasks of all sizes including 200 L. With Isojackets for the column and manual or automatic control, you can rely on trouble-free heating of your glass plant to any required temperature.

★ **Flameproof range now covers 1 L. to 200 L. :**

Send for Catalogue LM describing Isomantles for glass plant, and 44-page catalogue dealing with Industrial Electric Surface Heaters.

Visit our Stand No. 8 at the O.C.C.A. Exhibition, Royal Horticultural New Hall, London, S.W.1. 17th-19th March, 1959



ISOPAD LTD

**ELECTRIC
SURFACE
HEATERS**

ISOPAD LTD. BARNET BY-PASS, BOREHAM WOOD, HERTS. Tel: Histon 2817/9

SOLD BY COLES

Raw Materials for Surface-Coating and Compounding

Just to remind you that we are concessionaires for the following well-known manufacturers of the highest repute in their respective fields.



PICCOPALE Petroleum Resins
PICCOLASTIC Substituted Styrene Resins
PRODUCTS OF
Pennsylvania Industrial Chemical Corporation

B.X. TERPENE RESINS
PRODUCTS OF
B.X. Plastics Ltd., Manningtree



POLYVINYL ACETATE EMULSIONS
METHACRYLATE POLYMERS
EMULSIONS AND SOLUTIONS

PRODUCTS OF
Plastic Products Limited, Croydon, Surrey

STEMAG

STEATITE MILL BALLS AND
LINING BLOCKS FOR BALL MILLS

PRODUCTS OF
Steatit-Magnesia Aktiengesellschaft, Germany

Struktol

Emulsion Plasticisers

W.33 for natural and synthetic rubbers
BUTYL STRUKTOL for Butyl rubbers
Also NEOPAST zinc oxide paste and sulphur
dispersion pastes, soluble and insoluble.

O.C.A. Exhibition



STAND No. 76

R. H. COLE & Co., Ltd.

2, Caxton Street, WESTMINSTER, S.W.1
Telephone: ABBey 3061 (10 lines). Telegrams: Geratale, Phone, Ldn.

BULK LIQUIDS



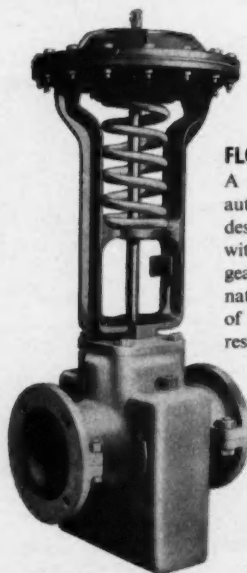
ACIDS CHEMICALS
ALKALIS SOLVENTS
CAUSTICS EMULSIONS
PETROLEUM PRODUCTS
ETC.

MONKTON MOTORS LTD

WALLINGFORD ROAD,
UXBRIDGE, MIDDY. 5574/5

WM FLOWLINE

VALVES



FLOW CONTROL PINCH VALVES

A new range of pinch valves for automatic or remote operation designed for use in conjunction with standard or special control gear. This valve combines the naturally good flow characteristics of a pinch valve with good response characteristics when used in conjunction with standard instruments; whilst not quite linear the response is markedly superior to other designs of pinch or diaphragm valves. If you prefer electric operation, we can provide it.

WARREN-MORRISON LTD

41 ST JAMES'S PLACE, LONDON S.W.1. MAYFAIR. 9895

ULTRASORB ACTIVATED CARBON

ULTRASORB Carbons are available for recovery of most industrial solvents, benzole extraction, water purification and other gas and liquid phase applications.

BRITISH CARBO NORIT UNION LIMITED

LONDON ROAD, WEST THURROCK, GRAYS, ESSEX

Cables: 'Bricarun Grays'

Tel.: Grays Thurrock 4845

CARBO-UNION-WHESOE

Activated Carbon Recovery Plant for the purification of gases and the recovery of vapour phase solvents.

Whessoe Ltd : Darlington : Co. Durham

Cables: Whessoe Darlington

Tel.: Darlington 5315

London Office: 25 VICTORIA STREET, S.W.1

ABBey 3881

DARLINGTON

magnesia

FOR ALL INDUSTRIAL
AND PHARMACEUTICAL
PURPOSES

Sole selling agents in Great Britain

**CLIFFORD
CHRISTOPHERSON
& CO LTD**

TELEPHONE: KENSINGTON 3422

TELEGRAMS: CHRISTOPHERSON,
WESPHONE, LONDON

1 KNIGHTSBRIDGE GREEN,
LONDON, S.W.1



THE CHEMICAL & INSULATING CO. LTD., DARLINGTON, CO. DURHAM - A MEMBER OF THE DARLINGTON GROUP OF COMPANIES

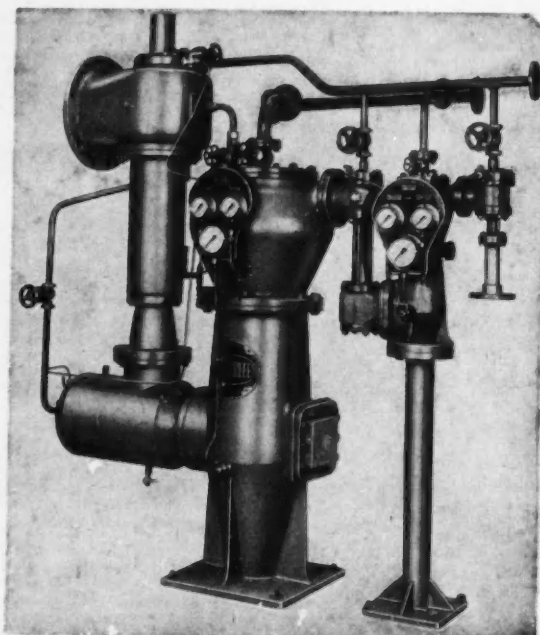
Mirrlees' EJECTOR AIR PUMPS

This is one of the many types of "Mirrlees" ejector air pumps.

The steam operated ejector has been a speciality of the Mirrlees Watson Company since its introduction as an air pump, and we claim a large share of the credit for the almost universal adoption of this type of apparatus for air extraction, and the production of vacuum in modern condensing plants and other industrial processes where pressures less than atmosphere are required.

The MIRRLEES WATSON
COMPANY LIMITED

Head Office and Works: SCOTLAND ST., GLASGOW, C.5
London Office: 38, Grosvenor Gardens, S.W.1



INTRODUCING

VITREOUS ENAMELLED TRAYS

M O R E D U R A B L E L E S S C O S T L Y

We are now pleased to offer Drying Trays, finished in Best Quality Acid Resisting Vitreous Enamel, in sizes 32" x 16" x 1½" deep, or 32" x 32" x 1½" deep, with rounded corners and sides, to facilitate emptying and cleaning, and we are confident that these Trays represent outstanding value. Not only are they more durable and more robust, but their cost offers considerable economy.

We invite your enquiries for these remarkable Trays, in either of these sizes, or to individual requirements



CONTROLLED CONVECTION DRYING CO LTD
CLEVELAND BUILDINGS 94, MARKET STREET
Manchester, 1. Telephone: Deansgate 7391

this is the **HOSE** that Jock built

A request for a specially good length of MacLellan Chemical Hose for photographing needed Bob Montgomery, Hose Department Foreman, and 'Jock' to everybody during his war service in the Gunners.



"You can take any piece you want," he said. "They're all as good as can be made." Then he finished off personally a length of 3 in. bore, and set an apprentice to brushing off every speck of dust. And he watched the photographer's preparations as keenly as a film star's manager. Real pride in work produced is nothing new at MacLellan's.

A reputation for rubber manufacture and achievement built up over eighty years is worth maintaining.

In supplying hose, MacLellan do two things. They maintain adequate stocks of standard grades and most-asked-for bores and lengths at all depots. And they give immediate enthusiastic attention to requests for special qualities, special sizes and special construction. Either way, they can meet your needs precisely. Suction and discharge hose for chemicals, oil, water, sand, slurry, etc. Lengths generally up to 60 ft. Express delivery.

MacLellan

HOSE

George MacLellan & Co. Ltd.

155-165 Shuna Street, Maryhill, Glasgow, N.W.

Telephone : Maryhill 5111/9

Telegrams : 'CAOUTCHOUC' Glasgow

For over eighty years, makers of rubber for industry; suction and discharge hose, conveyor belting for outdoor and underground service, expansion joints, rubber jointing and cut joints, Macbond rubber and ebonite lining and covering, Mactex rubber buckets, roller and idler covers, asbestos millboard, protective clothing.

Stocks at:

London :
Burstons Road,
Putney, S.W.15.
Telephone:
Putney 5678.

Belfast :
60b North Queen
Street.
Telephone: 22822.

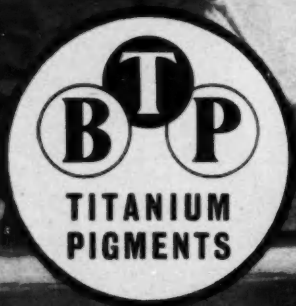
Newcastle
3-5 Queen Street.
Telephone: 27617.

**TECHNICAL REPRESENTATIVES
THROUGHOUT THE COUNTRY**

TIOXIDE for **hiding** **power!**



See
Stand 22
O C C A
EXHIBITION



British Titan Products Co Ltd

VOL. 81

No. 2070

MARCH 14 1959

Telephone: FLEet Street 3212 (26 lines)

Telegrams: Allangas - Fleet - London

Editor

M. C. HYDE

Manager

H. A. WILLMOTT

Director N. B. LIVINGSTONE WALLACE

Midland OfficeDaimler House, Paradise Street,
Birmingham. [Midland 0784-5]**Leeds Office**Permanent House, The Headrow,
Leeds 1. [Leeds 22601]**Scottish Office**116 Hope Street, Glasgow C2.
[Central 3954-5]**IN THIS ISSUE**

Salt Water for Cooling	452
Beecham Research on Penicillin	453
Letters to the Editor	455
Distillates	456
S.A.C. Anniversary Dinner	457
O.C.C.A. Exhibition Previewed	459
I.C.I.'s New Winnington Lab.	468
New Chemicals from B.D.H.	469
Chemist's Bookshelf	470
People in the News	474
Overseas News	475
Commercial News	476
Market Reports	476
New Patents	478
Diary Dates	478
Trade Notes	479

Annual subscription is: home, 52s 6d,
overseas, 60s, single copies 1s 6d (by
post 1s 9d)

CHEMICAL AGE

BOUVERIE HOUSE • 154 FLEET STREET • LONDON • EC4

PENICILLIN BREAKTHROUGH

ONCE again in the development of antibiotics, British scientists have triumphed. The Beecham Research Laboratories team headed by Dr. G. N. Rolinson and F. P. Doyle, with Dr. J. H. C. Naylor and F. R. Batchelor, have isolated the 'core' of penicillin—6-amino-penicillanic acid—after three years of research. The way is now open to 'tailor-make' any number of new penicillins, by chemical means, as distinct from microbiological methods and the consequences will undoubtedly be far-reaching.

In accomplishing this major breakthrough in the penicillin field, the Beecham group have had the advantage of careful consideration of their research plans, the encouragement of the director of research at Brockham Park, Dr. John Farquharson, the skilled guidance of Professor E. B. Chain, one of the discoverers of penicillin, and the advice of those eminent organic chemists, Sir Ian Heilbron and Dr. A. H. Cook, each of whom was also involved in the early work on penicillin.

As Professor Chain has stated in his congratulatory cable to the Beecham research team, the discovery of 6-amino-penicillanic acid "fulfils the hopes organic chemists have had for years". New antibiotics are reported every year but until now the only method of producing a new penicillin has been to add given substances to the fermentation brew in the hope that these would alter the penicillin mould and result in a new product. This has been a trial and error technique with no guarantee that addition of any particular substance would produce the designed penicillin. Also, this technique is time-consuming.

With the isolation of 6-amino-penicillanic acid chemists now have the substance regarded as the common parent amine of the various penicillins available today. The generally accepted view is that these penicillins can be regarded as acyl derivatives of 6-amino-penicillanic acid and that the last stage in penicillin biosynthesis is the introduction of the acyl side chain (see formulae in p. 453).

Foremost in this discovery is the hope that it may lead to the solution of those two difficult problems associated with penicillins today. Although penicillin is still the most useful and the most non-toxic of all the antibiotics now available, there is still penicillin-sensitivity and penicillin-resistance. In the case of penicillin sensitivity only a certain number of people are effected and desensitisation has proved unsatisfactory. With substitutions on the basic radical, there is every possibility that effective penicillins can be produced which will not lead to untoward reactions in penicillin-sensitive persons.

Of even greater importance is the hope now offered of overcoming the problem of micro-organisms that become resistant to the action of penicillin. In the last few years, the widespread occurrence of staphylococcal resistance in hospitals has attained serious proportions. One of the main searches the Beecham research chemists are undertaking is the development of a 'tailor-made' penicillin effective against penicillin-resistant staphylococci. Efforts are also to be directed to the development of penicillins effective against the gram-negative organisms such as B. Coli. Although penicillin has a wider antibiotic spectrum than any other known antibiotic, it is still ineffective over a considerable range of bacteria. 'Tailor-made' penicillins

will therefore be prepared and investigated for diseases such as leprosy, tuberculosis, the venereal diseases, measles, whooping cough, scarlet fever and viral diseases.

All this will of course mean that many 'tailor-made' penicillins must be prepared and screened pharmacologically, before the even lengthier procedure of clinical trials is begun. Beecham's have been spending £400,000 a year on research of which something like £200,000 a year has been spent on their antibiotic research. Their discovery has received some recognition from British antibiotic manufacturers, but it is the U.S. antibiotic industry which has made direct approaches to the company. With only two exceptions, every large U.S. pharmaceutical company engaged in research on the production of antibiotics has approached Beecham's offering collaboration in research and development. Because further research of considerable magnitude is needed to exploit the discovery as quickly and fully as possible, Beecham's are now engaged in negotiations regarding research and development with a large U.S. company. Mr. H. G. Lazell, chairman of Beecham Group Ltd., says that such a collaboration is necessary to speed up the research work and to make the new penicillin compounds readily available on a commercial scale.

Despite all efforts, Great Britain still does not possess research laboratories so well equipped or of such a size that preparation of the compounds and their pharmacological testing is possible. Collaboration with a U.S. company is therefore inevitable, but must be a bitter pill for British scientists to swallow.

Fleming, it will be recalled, did not patent his penicillin discovery so that the U.S. manufacturers stepped in and patented their 'deep fermentation process' and Britain has had to pay patent rights on penicillin ever since and has, of course, lost fantastic sums of money. In the present instance, however, the Beecham group have already applied for patents for the basic process on 6-amino-penicillanic acid and on all processes which can be worked from it, in 20 countries. These include the British Commonwealth, the U.S., and all European countries this side of the Iron Curtain except Italy, where no patent protection exists. There is every possibility, therefore, that the isolation of 6-amino-penicillanic acid will prove a good dollar earner for this country.

SALT WATER FOR COOLING

INDUSTRIAL users of large quantities of fresh water for cooling have long realised that once-through use of water is wasteful and costly. Hence the installation of cooling towers designed and built for maximum utilisation of available water supply. Demand for cooling water is growing proportionately, however, and J. J. Finnerly, project engineer of Foster Wheeler Corporation's cooling tower department, indicates that 1 gal./min. of cooling water is required to produce 1 kW of electric power, viscose rayon production requires 2 gal. per lb. of finished product; oil refineries utilise approximately 750 gal. of cooling water to produce one barrel of oil; and the chemical industries demand 50 to 300 gal. of water per lb. of finished product.

Engineering studies recently by oil refineries, chemical plants, etc., have concentrated on using brackish or salt water. With such waters it has been found more economical to install water-cooling towers instead of once-through systems. The pioneer application of using salt water cooling towers, it is considered, will soon have universal application. These are already in service in the U.S. A notable example is the California Oil Co., a subsidiary of Standard Oil Co., who installed a 15,000 g.p.m. Foster Wheeler two-section salt water induced draught counterflow cooling tower in 1957. In analysing the need for the greatly increased quantities of cooling water for the expanding

process-unit, Standard Oil engineers estimated that to build up the existing once-through salt water system installed in 1950 would cost 65% more when compared with the cost of installing a salt-water cooling tower. In 1956, therefore, a 6,000 g.p.m. unit was built. A second and larger section of this unit was built a year later. This is a three-cell induced draught tower capable of cooling 9,000 g.p.m. from 110.5 to 82.5°F, at an atmospheric wet bulb temperature of 77°F. The three cells of the tower each measure 36 ft. by 30 ft. by 52 ft. high. Overall tower dimensions are 36 ft. by 90 ft. by 58 ft. high to the top of the fan stack from the 9 ft.-deep basin which provides a 24-minute water storage capacity.

Structurally and thermally designed for salt water service, this tower is entirely built of redwood. To avoid salt water corrosion of surrounding facilities, particular attention has been paid to reduction of spray loss, which is guaranteed not to exceed one-tenth of 1%. This was achieved through the combined design of low exit air velocities, a high plenum chamber between eliminators and roof deck and the use of Foster Wheeler 'Chevron' style two-pass drift eliminators.

METAL DEVELOPMENTS

SCIENTISTS of the U.S. Bureau of Mines laboratory at Albany, Oregon, U.S., have successfully produced the world's first molybdenum casting in what is considered to be a major metallurgical breakthrough of importance to the U.S. space and missile programme. They have also developed an improved yttrium metal for scientific uses.

Molybdenum, which melts at the high temperature of 4,748°F, has until now resisted efforts to form it into casting, since in its molten state it destroyed the crucible. The bureau's metallurgists have produced a simple cylindrical molybdenum casting and are now working on methods to improve techniques so that various intricate shapes can be produced. Such items would advance the development of missile, rockets and satellites.

Under remote-control conditions, a high-density electric arc has been employed to melt a 30 lb. charge of molybdenum in a water-cooled, copper-lined crucible. The intensely hot metal was poured through a series of troughs into a rotating graphite cylinder that forced the metal to the walls of the rotating mould where it was consolidated, and 'frozen' to produce a hollow molybdenum cylinder 4½ in. wide and 8 in. long.

Yttrium metal, long considered too brittle for structural uses, has been transformed by the bureau scientists into a pliant, easily formed material that may solve the difficult problems in atomic reactor and missile design. Through investigations in high-purity metals, it was found that yttrium's forming qualities could be improved by ridding it of dissolved gases. The high-purity yttrium produced by the U.S. Bureau of Mines is stated to contain only about 0.08% oxygen, which is the principal element limiting ductility.

The technique for achieving the high-purity required for ductility is reported to be similar to the famed Kroll process, engineered by the bureau from laboratory to commercial scale for titanium and zirconium.

Now that ductility has been attained—laboratory workers have reduced small ingots as much as 95% in thickness without annealing—yttrium's other properties suggest its use in building atomic reactors and atom-powered missiles. One of yttrium's virtues in the nuclear field is its relatively low thermonuclear cross section. The metal also has a relatively high melting point at 2,825°F (roughly equivalent to that of carbon steel). This is high enough to enable yttrium to withstand the temperatures encountered by reactor parts that might utilise its thermonuclear properties. There is also a potential value for yttrium in alloys.

BEECHAM RESEARCH WORKERS PAVE WAY FOR 'TAILOR-MADE' PENICILLINS

Breakthrough on 6-Amino-Penicillanic Acid

ISOLATION of 6-amino-penicillanic acid has resulted from an observation of a discrepancy in microbiological and chemical assays, which normally agree.

This major breakthrough in the field of antibiotics has been accomplished by a research team of Beecham Research Laboratories, Brockham Park, near Dorking, Surrey, led by Dr. G. N. Rolinson, head of the microbiology department, and F. P. Doyle, head of the chemical department.

Other members of the team were F. R. Batchelor (biochemist), and Dr. J. H. C. Naylor, head of the organic research group. Professor E. B. Chain, of the International Centre for Chemical Microbiology, Istituto Superiore di Sanita, in Rome, has also been concerned in this new discovery in the field of penicillin. Professor Chain, who is principal microbiological consultant for the Beecham Group, worked on the development of penicillin with Florey and Fleming, for which he and they were awarded the Nobel Prize.

Under Chain's Guidance

Under Professor Chain's guidance, two of the team, Dr. Rolinson and Dr. Naylor, worked for a year in Rome carrying out experiments on *p*-amino benzyl penicillin. It was during these experiments that discrepancies were observed between chemical and biological methods of penicillin assay when a precursor was omitted from penicillin fermentations (*Nature*, 1959, **183**, 180). Fermentations were carried out using *P. chrysogenum* 5720c (a sub-strain selected from 5120 *Wis*) and a peanut meal/lactone medium. *p*-Aminophenylacetamide was added at the rate of 0.05% every 24 hr. Paper chromatography indicated the formation of two principal penicillins and smaller amounts of two others as a result of the addition of the precursor. The two principal penicillins were eluted from paper chromatograms (zones 3 and 4) and zone 3 was identified as *p*-amino benzyl penicillin. After acid hydrolysis *p*-aminophenyl acetic acid was identified on paper chromatograms and also estimated quantitatively. The penicillin from zone 4, however, although giving *p*-amino phenyl acetic acid after acid hydrolysis, could not be diazotised except after acid hydrolysis, suggesting this penicillin to be a substituted *p*-amino benzyl penicillin. The nature of penicillin 1 and 2 remained unknown.

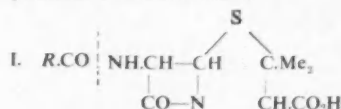
During the course of chromatographic extraction of *p*-amino benzyl penicillin, a white crystalline solid separated out on cooling, which, after recrystallisation, was identified as the monohydrate of *p*-acet-amido-phenyl acetamide. The formation of this material during the fermentation suggested that penicillin 4 which appeared to be a substituted *p*-amino benzyl penicillin, might be *p*-acetamido benzyl penicillin. Comparison of this substance with an authentic preparation of *p*-acet-amido benzyl penicillin prepared from



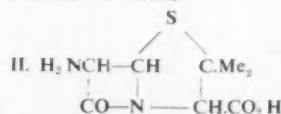
F. P. Doyle, head of chemistry department, Dr. J. H. C. Naylor, head of organic research group, and F. R. Batchelor, biochemist, microbiology department, at the Beecham Research Laboratories

p-amino benzyl penicillin showed them to be indistinguishable on paper chromatograms.

In a further communication to *Nature* (1959, **183**, 257, 24 January) the Beecham team stated that the presence of 6-aminopenicillanic acid formula II



Penicillin molecule

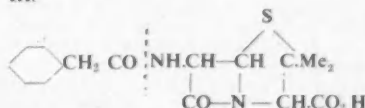


6-amino-penicillanic acid

was first indicated when a fermentation liquor (the culture used was an isolate from *P. chrysogenum* W.5120)

after removal of natural penicillins by solvent extraction at low pH, was treated with an excess of phenyl acetyl chloride in the presence of a weak base such as sodium bicarbonate. This resulted in the formation of an antibiotic substance which was readily destroyed by penicillinase and which behaved similarly to penicillin G (Benzyl penicillin) (formula III).

III.



Benzyl penicillin

on paper chromatograms. Reaction with phenoxyacetyl chloride resulted in the formation of an antibiotic resembling penicillin V in its stability in acid solu-



Dr. G. N. Rolinson (left), head of the Beecham microbiology department, and Professor E. B. Chain, Rome, the group's consultant on microbiology

tion as well as its behaviour on paper chromatograms.

The phenylacetyl chloride reaction in the presence of sodium bicarbonate was readily adapted to the detection of 6-amino-penicillanic acid on paper chromatograms. Conversion of the acid to benzyl penicillin on paper strips also provided a convenient method of assay.

Details of the isolation of pure crystalline 6-amino penicillanic acid are to be



L. to r.: W. McGeorge, director, Beecham Group Ltd., H. G. Lazell, chairman, and Dr. J. Farquharson, director of research, Beecham Research Laboratories, Brockham Park

reported at a later date. It has a melting point of 208-209°C with decomposition and C, 44.6%; H, 5.7%; N, 13.1%; S, 14.1%; $C_8H_{12}O_2N_2S$ requires C, 44.4; H, 5.6; N, 13.0; S, 14.8%. Phenylacetylation and subsequent biological assay on paper gave 2,740 units of benzyl penicillin per mg. of starting material.

6-Amino-penicillanic acid itself has been found to possess definite antibacterial properties, although these are stated to be of a much lower order than those of benzyl penicillin, and the spectrum is of a different type. It is destroyed as is benzyl penicillin by penicillinase but at a much slower rate. It is rapidly decomposed by strong alkali but is relatively stable to acids. The compound has been found to be a 'surprisingly strong acid', the isoelectric point being about 4.3.

In support of structure II is the evidence obtained by treating the substance with ethyl chloroformate to give a crude N-carbomethoxy derivative which has been degraded to N-carbomethoxy-amino acetaldehyde 2:4 dinitro phenyl hydrazone using Dutcher *et al.*'s general method. This compound admixed with a specimen synthesised from aminoacetal.

Benzyl penicillin prepared by phenyl acetylation of II has been isolated as the N:N'-dibenzylethylenediamine salt, having a melting point after recrystallisation of 114-115°C which was not depressed

after admixture with an authentic specimen. This same phenylacetylation product has been degraded to benzyl penilloaldehyde.

Dr. John Farquharson reported that the Beecham research team decided to concentrate their research upon one proven antibiotic, which was non-toxic—penicillin, and by combining the sciences of microbiology to produce new penicillins. As a starting point they had sought to produce by conventional fermentation methods a penicillin amenable to chemical modification, after fermentation, into new and unknown penicillins. It took the Beecham microbiologists the best part of a year to work out the conditions for the mould to produce one modifiable penicillin and to extract a small quantity for the chemist to work on. During the course of the work the two conventional methods of assay, microbiological and chemical, were used. Consistent discrepancies were noted between the results of the two methods which normally agree, and there was no explanation in the current state of knowledge. The chemists to whom the problem was taken, deduced that the fermentation liquor contained an intact penicillin-like material, most probably, Doyle thought, the 'core' of the penicillin molecule, that is, 6-amino-penicillanic acid. That this deduction was correct is seen from the results described in *Nature* (see above).

Results to date show that under all conditions from idling to full load, the temperature of the catalyst was maintained within its active range even though the carburettor was set to supply a lean mixture whenever the throttle was more than slightly open. The catalyst was effective over the full range of conditions and on the average, reduced the amount of carbon monoxide in the exhaust gas by about 85% and hydrogen by about 80%.

Somewhat erratic results were obtained with the combustible constituents present in very small quantities but the amounts of methane, higher hydrocarbons and soot were usually reduced to about half. The percentage of aldehydes was little changed, however. In general, it is reported, the best results were obtained under conditions corresponding to a high concentration of combustible gases with a long residence time in the catalyst chamber. After a run of 11,000 miles a small but definite decrease in catalyst performance occurred but the catalyst and its container appeared to be in good physical condition.

Hydrocarbons in Exhausts

Determining organic compounds in exhausts. Soot from a diesel engine, collected on filter paper, has been extracted with a suitable solvent and the mixture of polynuclear aromatic hydrocarbons in the extract was separated by chromatography on alumina. Development revealed the hydrocarbons as discrete bands on the column, fluorescing in ultra-violet light, and fluoranthene and pyrene were identified as major constituents with chrysene, 1:2 benzpyrene and coronene present in much smaller concentrations. Other hydrocarbons, together with certain acidic and basic constituents, were also present, but have not been identified.

Removal of sulphur compounds from flue gas. Work has continued on the possibility of removing oxides of sulphur from flue gas and recovering the sulphur as sulphuric acid. It is reported that sulphur dioxide can be removed from flue gas with a high efficiency by scrubbing with water containing manganese dioxide in suspension, and that an efficiency of 96% can be maintained even when the concentration of the sulphuric acid produced reaches 40%. Initial product from the scrubber is 40% sulphuric acid containing about 20% of manganese sulphate in solution. The manganese sulphate can be removed by electrolysis which regenerates manganese dioxide. Conditions have not yet been found, however, under which all the manganese sulphate can be decomposed economically in this way to leave sulphuric acid of sufficient purity to be saleable.

Combustion of coal smoke and soot. Results of experiments carried out at three temperatures indicate that the smoke burns in preference to other combustibles, and that at 750°C it is possible to burn all but about 15% of the smoke in less than 0.5 sec, using only about one-third of the air theoretically necessary to burn all the volatile combustible matter. Other experiments have shown that soot in a furnace flame can be burnt provided the temperature does not fall below 725°C.

D.S.I.R. REPORT ON CURRENT AIR POLLUTION RESEARCH

WORK of the Fuel Research Station on the abatement of atmospheric pollution is included in the recently published Department of Scientific and Industrial Research *Investigation of Atmospheric Pollution: Research and Observations in the year ended 31 March 1957, 30th Report* (obtainable from H.M.S.O., 7s 6d net). The report by the director of fuel research describes investigations undertaken under the guidance of the Atmospheric Pollution Research Committee who have been concerned with dispersion of chimney gases, determination of oxides of sulphur in the air, and liaison with other organisations concerned with problems of air pollution.

In addition to the experimental work in progress at the Fuel Research Station, two problems of air pollution are being investigated at the Universities as part of the programme of the Fuel Research Board. Under the supervision of Professor M. W. Thring, at the University of Sheffield, the question of abatement of smoke from metallurgical furnaces is being studied and under Professor P. A. Sheppard, Imperial College, London, dispersion of chimney gases in the atmosphere is being investigated.

Data collected by co-operating bodies for sulphur dioxide are given in the report of the director of fuel research. These results, as determined by the volumetric and lead peroxide methods, show that in general these are similar to those previously reported. During 1956-57 peak values for sulphur dioxide and for smoke

occurred less frequently than during the previous year.

More careful attention is being paid to the measurement of industrial smoke and to estimating density of the smoke plume from boilers and furnaces. Because of disadvantages of determining smoke density by the Ringelmann chart, an endeavour is being made to develop a small portable instrument for use by one observer. The instrument developed to date, which in principle consists of a small telescope, contains a number of translucent screens, darkened to standard shade, with which the smoke can be compared. It is stated to be easy to read and consistent readings are obtained by different observers.

Catalytic combustion of exhaust gas. One method of reducing atmospheric pollution caused by exhaust gas from petrol engines is to burn the combustible constituents in a catalytic combustion chamber which replaces the normal silencer. A proprietary device developed in the U.S. to work along these lines is being examined.

The catalytic combustion chamber is made of stainless steel with welded joints to withstand both the high temperature and corrosive action of the exhaust gas. Gas from the engine, mixed with a small proportion of induced air, passes through a bed of pelleted catalyst which becomes active at temperatures exceeding about 500°F, and brings about combustion of the carbon monoxide, hydrocarbons, hydrogen, aldehydes and other combustible constituents of the gas.

Amersham Takes Over Isotopes Production

PRODUCTION and marketing of radioisotopes by the U.K. Atomic Energy Authority will in future be carried out entirely by the Radiochemical Centre at Amersham, Bucks. Up to now this work has been shared with the Isotope Division of A.E.R.E., Harwell.

Dr. W. P. Grove has been appointed director of the Radiochemical Centre, which has been reorganised to form a single comprehensive organisation for producing and marketing isotopes. The centre will have irradiation facilities at Harwell and other sites of the authority.

Users of radioisotopes should continue, until they are advised of new arrangements, to order their requirements from Amersham or Harwell as they have done in the past.

Research into the properties of isotopes and new applications of them and their radiations will be continued by an isotope research division at Harwell and at the Wantage Radiation Laboratories. This division will continue to operate the isotope school.

A.R.C. to Take Over Food Research Stations

THREE stations of the Department of Scientific and Industrial Research—all concerned with the preservation, storage, handling or protection of foodstuffs—will be transferred to the Agricultural Research Council on 1 July. They are the Ditton Laboratory at Larkfield, Kent, the Low Temperature Research Station at Cambridge, and the Pest Infestation Laboratory at Slough.

The agreement between the Council for Scientific and Industrial Research and the Agricultural Research Council—which has received the approval of the Lord President of the Council (Lord Hailsham)—was made because the two Councils believe that it is in the national interest to bring all Government research on food other than fish under one body. The aim is to make the research more effective.

The staff in the three laboratories, numbering about 200, will be invited to transfer to the service of the Agricultural Research Council. If they accept, they retain their existing pension rights and conditions. No redundancy is expected as a result of this transfer.

Glass Fluid Waste System

More than two miles of glass piping with 6,000 glass parts will be used in the all-glass fluid waste system in Nottingham University's new chemistry building.

Q.V.F. Ltd., Fenton, Stoke-on-Trent, have received the contract, for £30,000.

Spectro-analysis Conference

The eighth conference of the Spectro-analytical Congress is to be held in Lucerne, Switzerland, on 14-19 September, 1959. Organisation will be by the Swiss Association for Spectro-analysis. Details are obtainable from: Colloquium Spectroscopium Internationale, Schaffhausen, Switzerland.

Letters to the Editor

'More Articles on Processes Would Stimulate Technical Men'

SIR,—The statements in your editorial of 7 March that firms in the chemical industry attempt to withhold information unnecessarily and, on occasions, ineffectively, are well established by the examples you give. On the other hand, the arguments in favour of releasing more information to the technical press may not be as strong as you suggest. It is true, as you state, that a news story might interest readers who include customers and potential customers; it would undoubtedly interest competitors and potential competitors even more. Buyers of, for example, dress fabrics, anaesthetics, fertilisers and detergents, are not usually interested in the technical details of manufacture, nor are they regular readers of the *CHEMICAL AGE*. Even the buyers of, say, pumps, filters and plastics for technical purposes—that is, people who are likely to read the *CHEMICAL AGE*—are more interested in performance than the manufacturing process.

There are, I think, better arguments than this one in favour of less secrecy. For example, well-informed articles on a wide variety of industrial processes can have a stimulating effect on technical men and may broaden the outlook of the younger men in industry, with resulting benefits to individual firms and industry as a whole.

So far as the Gas Council's reticence

on the shipment of liquid methane is concerned, it may well be that the council decided that modesty was the appropriate virtue until the success of its enterprise was established. This first shipment of methane was an experiment and it appears now to have been successful. I think that if I had been in charge of the operation, I would have shunned publicity until success had been achieved. "Let no man that girdeth on his harness, boast himself as he that putteth it off."

Yours, etc.,

R. F. TWIST.

20 Westbrook Road,
Blackheath S.E.23.

(Mr. Twist is right in saying that *CHEMICAL AGE* does not go to buyers of fertilisers, detergents, etc., but it is read by those who buy chemicals as raw materials to make fertilisers and detergents. The great majority of all inquiries to this journal seek more technical data on new processes.)

There are three criticisms against the Gas Council's secrecy on its methane shipment: 1, public funds were involved; 2, such an important project could not fail to be newsworthy as its success would point to a new major gas-making material as well as a new major raw material for chemical producers; 3, technical details denied the British press were published in the U.S.—*Editor*.)

Too Many Chemists Employed to 'Take in Each Other's Washing'

SIR,—You do well, in your current editorial, to focus attention on the mania for secrecy which seems to be infecting part of our chemical industry. British chemical industry functions here in very sharp contrast to that in the United States, where, with few exceptions, new materials are sold by name, processes are described in full, and it is quite easy to obtain samples of competitive products by direct application to the manufacturers.

The root of the trouble in this country seems to lie in commercial control of management, and the lure of the catch phrase "trade secret". It is partly caused by the timidity of the chemical industry to launch new products on the market, and to endeavour to overcome the innate conservatism of users of existing products to retain inefficient processes. The same policy restricts publication in scientific journals of much fundamental work, which is kept secret with the excuse "Why tell our competitors what we are doing?"

This secrecy is, however, symptomatic of something much more serious. It is the fact that far too many chemists and other scientists are being employed "taking in each other's washing," and spending their lives rather uselessly in an

endless matching of competitors' samples. One of the results is that many capable research workers leave the laboratories in disgust, and themselves enter the commercial world where rewards are higher and frustrations less.

I submit, sir, that if this country is to survive in the competitive world of today, a greater research effort is needed, and I would even suggest that a Royal Commission might even inquire into the efficiency of the use of scientists in industry. We must overcome tendencies to dismiss research as "speculation", and end the tendencies to muscle-in on existing markets, which result in the number of firms engaged in certain industries being several times the number in much larger scale production in the U.S.A.

Another factor damaging to the country's industry is the unwritten agreements between certain firms not to employ each other's staff. This is quite illegal, but many chemists know to their cost that it is in operation.

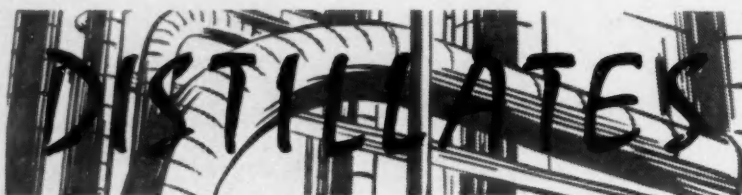
The institution of pension schemes which are generally transferable will also help to ensure that chemical staffs are more efficiently employed.

Yours, etc.,

H. WARSON,

British Chemist.

Hon. Editor.



★ AS USUAL the O.C.C.A. Technical Exhibition, which will be held next week, will show a host of new developments in chemicals and resins for the colour industry. While most of these are outlined in our exclusive preview of exhibits in pages 459 to 467, one or two firms are still keeping some new products up their sleeves.

One of these is the London company of Younghusband, Barnes and Co., who have deliberately given nothing away either in the material sent to us or in the official guide to the exhibition. Apart from a vague reference in the guide to the fruits of some intriguing research projects, the only other mention is of "various recent tendencies" in the drying oil field which arise from "economic considerations." These will be described at the exhibition, "including the wider use of soyabean oil products."

★ BY COINCIDENCE the press officer to a big German chemical company visited me last week, in time for me to ask his reactions as a German to the CHEMICAL AGE editorial on the British chemical industry's secretiveness.

He told me that he has spent the last few years trying to convince his directors that they should release more information to the press. He quoted the case of a development that had been licensed by his firm to a company in the U.S. While his own principals were not prepared to issue any information whatever, fairly full accounts were soon appearing in the American technical journals.

My friend, who shall be nameless, added that to get permission from his research department to say anything about a new product would take at least three generations of rats—and you know how long rats live!

★ WINNINGTON is a name to conjure with in the realm of chemical research. It was there that Brunner, Mond and Co. began operating their plant in 1873 when doubtless much work had to be done on solving the day-to-day problems during the turbulent months while the ammonia soda process settled down. Fame came to Winnington when F. A. Freeth arrived in 1909 and applied the phase rule theorem to the process and to the preparation of inorganic salts from solution. A talented scientific staff carried out pioneer work on ammonium nitrate in the first world war and was well fitted to the wider horizons that opened out when I.C.I. were formed in 1926.

Policy continued to change and an edict to "work out such new processes

as offer satisfactory financial returns, even though not directly connected with our present main products," enabled Alkali Division to branch out into wider fields of research. This led directly to Winnington's most popular claim to fame, the discovery of polythene in 1933 during an experiment into high pressures by R. O. Gibson, a chemist, who recorded in his notebook "... waxy solid found in reaction tube." Other valuable chemicals were discovered, although none quite so spectacular.

Now new laboratory extensions will enable the Winnington tradition to continue. Research workers are now studying "novelties in inorganic chemistry" and are seeking to improve existing alkali processes and products.

★ ALL my readers connected with advertising will find a special interest in NABS News. An eight-page newspaper, in *Daily Mirror* format, with a once only publication, has been produced to make the work of the National Advertising Benevolent Society better known, particularly to the younger generation. Personal interviews with members of the staff have been used to put over details of the society's charitable work and a centre pictorial feature cites an actual case of assistance to a widow with a young son.

Editorial and photographic material was supplied free of charge and several agencies have taken advertising space to help meet production costs. In addition, the society is charging 6d a copy to firms who, in turn, are selling the newspaper to members of their staffs, thus reaping a little more to add to the charity's funds.

Copies may be obtained from Miss Poynton, N.A.B.S., 27 Old Bond Street, London W.1; Mr. R. A. Loader, Samson Clark and Co. Ltd., 57 Mortimer Street, London W.1; and Mr. H. L. Clarkson, S. H. Benson Ltd., 129 Kingsway, London W.C.2.

★ THE amount of lime applied on U.K. farmland during the first 10 months of 1958 was almost 15% below the level of the previous year and was the lowest since 1954; this during a year when heavy rainfall caused a decline in the lime status of our soil through leaching. As a result 'maintenance' applications of lime to balance current losses were in many cases inadequate and progress towards eliminating the overall lime deficit—built up in the pre-war years of neglect—was slowed down.

The Agricultural Lime Producers' Council tells me that in 1957 it was estimated that 19 million tons of lime

(as CaCO_3) was required to correct soil acidity in England and Wales. Last year U.K. lime consumption was 3,508,000 tons, compared with 4,436,000 in 1957 and 4,803,000 tons in 1955. If about 4 million tons a year is the 'maintenance' need, anything above that amount is a contribution towards lowering the original deficiency. As the gap narrows, more lime is needed for maintenance because a fully-limed soil needs bigger regular dressings to keep it in good condition.

It is ironic that soil acidity and ample lime reserves have existed side by side for so long in this country.

★ A BUSY diary kept me from visiting the mobile exhibition of I.C.I. Plastics Division in London last week. From all accounts a number of interesting developments were on show at an exhibition that was primarily designed to tour the company's divisions to show chemists, engineers, technologists, plant technicians, designers, architects and administrative officers, the range of plastics being produced.

Some of the newer applications for the company's plastics materials shown included: Butakon butadiene copolymers; latex-coated washable wallpaper, resin/rubber floor tiles, latex-coated printing papers, nitrile rubber fuel hose; Melinex film for diaphragms, conveyor belting and as Permatrace for engineering drawing; Perspex bath; Darvic rigid p.v.c. sheet in expanded form, as machine guards and as Flovic p.v.c. foil-covered acoustic tiling; Maranyl nylon compounds for protective helmets, fuel filters and Nyzip fasteners; Fluon-coated tyre mould; from Alkathene were shown Netlon packaging, drum containers, and Visqueen all-weather shelter for the building industry.

★ OF RECENT months, there has been a general impression that while the U.K. has been exporting unrestricted equipment and materials to the U.S.S.R. and Soviet bloc countries, U.S. export trade in this direction had either slowed down or was non-existent. This view is to some extent confirmed by the U.S. Commerce Department's recent announcement that licences valued at \$10,213,000 were issued for the export of U.S. goods to the U.S.S.R., etc., in the fourth quarter of 1958. This was \$2,726,000 lower than in the third quarter of last year.

Major approvals to the bloc included methylene and polyvinyl chlorides (\$317,464), and styrene monomer (\$13,600). Among the major items denied licences were synthetic rubber (\$987,843) and polythene (\$277,782).

Alembic

'ANALYSTS NO LONGER IN BACKGROUND'



At the reception in the Fishmongers' Hall, l. to r.: Dr. K. A. Williams, past-president and chairman of publications committee, Professor H. J. Emeléus, president, Chemical Society,

Mrs. Emeléus; Dr. J. H. Hamence, S.A.C. president, Mrs. Hamence, Mrs. Stuckey and Dr. R. E. Stuckey, S.A.C. hon. secretary

New S.A.C. President Installed at Anniversary Dinner

THAT analytical chemistry was no longer regarded as the handmaiden of chemistry was a point made by Dr. J. H. Hamence, president, Society for Analytical Chemistry, at the anniversary dinner held at Fishmongers' Hall, London, on 6 March. Dr. Hamence, who presided over a company of more than 140 members and guests, was replying to the toast of 'The Society', proposed by Sir Harry Melville, secretary, Department of Scientific and Industrial Research, a guest of honour.

Among the guests were Professor Sir Charles Dodds, Courtauld Institute of Biochemistry, a guest of honour, who responded to the toast of 'The Guests'; Mr. Justice Lloyd-Jacob, chairman, Analytical Methods Trust; Mr. H. E. Monk, president, Association of Public Analysts; Professor H. J. Emeléus, president, Chemical Society; Dr. D. W. Kent-Jones, acting-president, Royal Institute of Chemistry, Dr. A. K. Mills, vice-president, Society of Chemical Industry; and Dr. E. B. Hughes, past-president, S.A.C.

Dr. Hamence said that Dr. James Craik at their St. Andrews congress and Professor M. Stacey at the International Conference on Microchemistry at Birmingham last year, had both paid tributes to analytical chemistry and its great value to industry and science today. It was gratifying that after so many years in the background, at long last it was realised that without the analytical chemist very little progress would be made in the scientific world.

He was also gratified that the 1957 Meldola Medal was awarded for the first time in history for progress in analytical chemistry; their congratulations were due to Dr. T. S. West for that honour.

Dr. Hamence spoke of the early days of the analyst and said that next year a notable centenary would be celebrated for it was in 1860 that the first Food and Drug Act was passed. The public analyst

who resulted from that Act started the first analytical laboratories.

Referring to the society's accounts he said that for the first time in 10 years, they had been balanced. Their thanks were due to the support of the Chemical Council and to the genius of their treasurer, Dr. Amos. The society hoped soon to gain exemption from income tax.

Proposing the toast of 'The Society,' Sir Harry Melville, said that the annual report had been a most satisfactory one. Everyone from the president downwards

must be extremely proud of it. He added: "You seem to have balanced the publications accounts. You must be the envy of many other societies."

Sir Harry declared that the founder members, those public analysts who had got together to protect themselves and to help check food adulteration, would have been shocked to find that today people bordering on physics could become members and propagate various methods. But analytical chemistry had broadened out and was now apparent in all branches of chemistry. Even theoretical chemists were getting involved in infra-red spectroscopy and perhaps they could be brought within the society.

Papers now delivered at S.A.C. meet-



Top, l. to r.: Dr. Norman Evers, editor 'Analytical Abstracts' and author of 'Chemistry of Drugs' just published by Ernest Benn, Miss P. E. Hutchinson, S.A.C. assistant secretary, Mrs. Amos, Dr. A. J. Amos, S.A.C. hon. treasurer, Mrs. Evers, and Dr. J. R. Nicholls, S.A.C. past-president. Bottom, l. to r.: Mrs. Brealey, Mrs. K. L. Smith, Mr. L. Brealey, S.A.C. assistant hon. secretary, Dr. S. C. Burgess, scientific adviser to L.C.C., Mrs. Burgess, and Mr. C. J. Regan, former L.C.C. scientific adviser

ings covered the whole range of chemistry—from nuclear magnetic resonance—almost theoretical physics—to clinical biochemistry. The analytical chemist had moved in the direction of the physical chemist and now found much use for physical methods. Sir Harry then spoke of changes in micro-chemical methods. Equipment was compact, chrome-plated and full of gadgets—the only thing that seemed to be lacking was a mechanism to type out the results on a piece of paper.

Proposing the toast of 'The Guests, Mr. R. C. Chirnside, the newly elected president, made special mention of Sir Harry Melville, whom he described as a distinguished chemist, a Nobel prize-winner and a Meldola medallist of long standing. Professor Emeléus was president of the world's oldest Chemical Society; the S.A.C. was the second oldest. In 1875, academic chemists regarded public analysts as being beyond the pale; the presence of Professor Emeléus and Sir Harry showed the changes that had taken place.

In a recent broadcast on the laboratories behind the doctors, Sir Charles Dodds had told listeners how much doc-



R. C. Chirnside, newly-elected president, left, with Dr. D. C. Garratt, chairman, Analytical Methods Committee

tors and their patients owed to analytical chemistry.

In reply, Sir Charles said it was quite true that medicine would not be in the position it was today without analytical chemistry.

At the end of the speeches, Dr. Hamence invested Mr. Chirnside with the president's badge of office. He was in turn invested with the insignia of a past-president.

New Work in Hand by S.A.C. Analytical Methods Committee

ONE of three new sub-committees appointed by the Analytical Methods Committee has undertaken a large programme on methods for additives in animal and poultry feedstuffs at the request of the scientific sub-committee, Ministry of Agriculture, Fisheries and Food. This is stated in the report of the council of the Society for Analytical Chemistry which was presented at the annual meeting last week. The additives for which recommended methods are required cover vitamins, minerals, hormones and other growth promoters, antibiotics and prophylactics. The sub-committee has the status of a steering committee and is setting up working panels to cover these five groups of materials.

Another of the new sub-committees, will prepare methods for chlorine in organic compounds. The third, the re-constituted pesticides residues sub-committee, is to institute an investigation into non-specific biological tests for the presence or absence of toxic residues; the project will be financed from the analytical methods trust fund.

Now that the work of the joint committee of the society and the Association of British Chemical Manufacturers has been completed with publication of the remaining methods for the analysis of trade effluents the committee has been disbanded. The A.B.C.M. trade effluents committee will act as the standing committee for future reference.

The other joint committee that of the S.A.C. and the Pharmaceutical Society on methods of assay of crude drugs has done much work in its two years. Reports are being prepared by three of the five panels on assay of capsicum, lonchocarpus and rauwolfia.

Other work on analytical methods includes a report on the revision of the method for lead which is to be published early in 1959 and a memorandum on the uses and handling of perchloric acid. Both have been prepared by the metallic impurities in organic matter sub-committee. The report by the vitamin-E panel on the assay of tocopherols in oils is in its final stages.

The council's report shows that membership now stands at 1,917, an increase of 17. In his report, Dr. A. J. Amos, hon. treasurer, states that the society's policy of becoming self-supporting and no longer dependent on grants from the Chemical Council came to fruition in 1958. Each of the publication accounts shows an excess of income over expenditure without the aid of grants and in the general account, income exceeded expenditure, even before inclusion of the profits from the publication's accounts. Attainment of this objective has now made it possible for the council to plan more surely for the future.

In a reference to *The Analyst*, it is stated that the average length of papers in 1958 was somewhat shorter. The report adds: "We think some papers could be shortened further with advantage."

I.C.I. Sell Dyestuffs To East Germany

East Germany has signed a contract to buy inorganic dyestuffs to the value of £100,000 from Imperial Chemical Industries Ltd., the East German news agency A.D.N. reports from Leipzig, where the contract was signed at the trade fair. The deal was negotiated by the I.C.I. Dyestuffs Division, Manchester.

Dr. Hamence on Importance of Bioassays

REFERRING in his presidential address to the work of the vitamin-E sub-committee which was nearing completion, Dr. J. H. Hamence, retiring president, said that apart from describing some novel techniques, it would give an account of the first collaborative quantitative paper chromatographic work to be undertaken.

Discussing the activities of the groups, he said that there was need for work to be done, particularly along the avenues which were as yet unexplored. Bioassays were beginning to play an increasingly important part in the determination of pesticide residues. He hoped that as a result of the work now being undertaken by the Analytical Methods Committee on this subject, they might before long become a routine operation in all laboratories concerned with the examination of foodstuffs.

There was also the other aspect which had been developed recently, namely, that of growth substances. Bioassays still remained the only method of assessment in some instances. Gibberellic acid was but one example of that and he suggested to the group concerned that this might be a subject for future consideration.

Vickers Get £2½ m. Order From U.S.S.R.

IN face of strong competition from the West German firm of Krupp, Vickers-Armstrong Ltd. have obtained a £2½ million contract for the supply of chemical plant to the U.S.S.R.

The plant, for making synthetic fibres, will be supplied in association with another British firm, Highpolymer and Petrochemical Engineers Ltd., who are the designers and consultants.

The order is still subject to "contract conditions."

Vickers are understood to be engaged in advanced negotiations with the Russians for the supply of three sugar plants at a cost of about £12 million.

Second British Oil-Gas Plant for Japan

A SECOND contract to build plant for the production of gas from heavy fuel oil in Japan has been obtained by Humphreys and Glasgow Ltd.

Using the Onia-Gegi catalytic oil gas process, the plant—to be built at the Himeji works of the Tokyo Shibura Electric Co.—will produce 500,000 cu. ft. of gas per day. It will be commissioned at the end of 1959 and will replace obsolete coal-gas retorts. The gas will be used for heating processes used in the manufacture of electrical equipment.

Himeji is a large transport centre about 30 miles from Kobe, and has a population of 290,000.

Japan's first Onia-Gegi plant is being built by Humphreys and Glasgow in conjunction with Ishii, at Yaizu, 150 miles from Tokyo.

New Chemicals and Resins will be Featured at O.C.C.A. Exhibition

C.A. Preview of New Products

NEW developments in chemicals and resins will be featured by many of the exhibitors at the Eleventh Technical Exhibition of the London Section, Oil and Colour Chemists' Association. In fact, practically every exhibitor will have something new to display or demonstrate for the main purpose of the exhibition is to stress newly developed products, new knowledge relating to existing products and their use and in certain cases, existing knowledge that is not generally available.

This exclusive *Chemical Age* preview of the exhibits features most of the new trends and developments that visitors will see at the exhibition next week.

Following a special luncheon at the Criterion, Piccadilly, on Tuesday, 17 March, the exhibition will be opened by Professor T. P. Hilditch, Emeritus Professor of Industrial Chemistry and an hon. member of the association, at 3 p.m. On the 18 and 19 March it will open at 10 a.m.; on all three days the closing time will be 7.30 p.m.

Development of Thalenic Acid

The main features of the exhibit of **Alchemy Ltd.**, Brettenham House, Lancaster Place, London W.C.2, will be developments in their range of solid and liquid plasticisers, with information on applications. The classes are:

Emulsion paints and lacquers: Benzyl and adipate esters are available for a variety of special applications.

Adhesives: Solid plasticisers in a range of melting points give heat sealing characteristics, better adhesion and resistance to water and chemical attack.

Plastisols: Low viscosity plasticisers for paste-making polymers, giving outstanding viscosity stability and control.

Reactive esters: Maleates and fumarates for internal plasticising of P.V.A. emulsions.

Metallic soaps: Details of the comprehensive range of naphthenates and octoates will be available, with technical staff to deal with specific problems in paint drying.

Burts and Harvey Ltd., Southampton, in addition to their standard range of coumarone-indene resins and dibasic acids, will show *p*-tertiary octyl phenol. Development products will include thalenic acid and dodecenyl succinic anhydride. (Stand 35.)

Resins, Dyestuffs and Pigments

Allied Colloids (Bradford) Ltd., 11 Great Saint Thomas Apostle, Queen Street, London E.C.4, are exhibiting at O.C.C.A. for the first time. They are showing resins, dyestuffs, pigments and auxiliaries manufactured by their principals, B.A.S.F., many of which are already well known in this country.

On display will be Emu Powder 120 FD, a styrene copolymer in powder form, which has numerous uses in both

the adhesive and paint fields, depending on the type and quantity of plasticiser used. This material has very good water resistance and has been used for underwater emulsion paints. Plastopal BT can be used as the basis of acid-catalysed wood lacquers, having up to three months' pot life. It affords very flexible films, with good abrasion and heat resistance. Resin AW2, an exceptionally clear cyclohexanone resin, has numerous uses in alkyds and nitrocellulose lacquers, besides being used to improve chemical resistance in lacquers based on chlorinated rubber and vinyl chloride copolymers. The Acronal polyacrylates range produces films of varying hardness with excellent light stability and adhesion to all surfaces. The Kurofan range of polyvinylidene chloride dispersions are of particular interest in flame-proof lacquers in conjunction with antimony oxide.

Among the pigments and dyestuffs to be shown will be the latest additions to the BASF phthalocyanine range, Helio-gen Blue LG and Green 5G, and the Zapon spirit-soluble dyestuffs, many of which are finding uses in polyester lacquers, owing to their stability to peroxide. (Stand 10.)

Radioactive Materials in Instruments

A three-section exhibit by the **Isotope Division, Atomic Energy Research Establishment**, Harwell, will show:

Instrumentation. The principles of operation and use of a number of instruments incorporating radioactive materials will be shown, for process-control and non-destructive testing.

Tracers. The principles underlying the industrial uses of radioactive tracers will be outlined, and some indications given of their possible uses in the paint industry.

Radiochemical laboratory. This section will show some of the simpler apparatus needed for straightforward laboratory experiments with low-activity tracers. (Stand 51.)

Adhesion of Pigmented Primers

The exhibit of **Associated Lead Manufacturers Ltd.**, 14-18 Gresham Street, London E.C.2, concentrates upon the

ability of Caldiox calcium plumbate pigmented primers to adhere firmly to new galvanised iron and steel.

Test panels show the condition of Caldiox primers compared with other primers after a three-year weathering test.

A second series of test panels demonstrate that this ability of Caldiox pigmented primers to bond firmly to zinc is equally applicable when quick-drying vehicles are used in formulating the priming paint.

There are experimental demonstrations which support the theory that the adhesion to zinc is due to the influence of the Caldiox upon the pH of any moisture penetrating the paint film. Under these conditions moisture reaching the zinc substrate will not cause the formation of embrittling zinc compounds. (Stand 78.)

Instrumental Comparison of Colours

Among the most interesting photometric products on the stand of the **Baldwin Instrument Co. Ltd.**, Lowfield Street, Dartford, Kent, will be:

Colormat, type 'S': This instrument compares quantitatively the colour of a sample against the colour of a standard specimen over the whole or part of the visible or near U.V. spectrum to an accuracy of $\pm 0.1\%$. Suitable for opaque solids, paint surfaces, paint pigments and powders.

Comparator densitometer: This instrument is designed for the measurement of turbidity, colour of varnish, liquids, etc., in a continuous process. It consists of a highly stabilised d.c. amplifier and two photocells in a balanced bridge circuit. This instrument can detect differences of about 1 part in 1,000.

Reflection densitometer: A direct-reading instrument for the measurement of colour or degree of whiteness. The instrument consists of a highly stable d.c. amplifier and a specially selected vacuum type photocell. The indicating meter is a "dead beat" moving coil type and can be supplied with linear calibration 0-100 or with near linear density 0-4. (Stand 74.)

New Principle in Pigment Production

Exhibits by **F. W. Berk and Co. Ltd.**, Berk House, Portman Square, London W.1, will include:

M.50: basic lead silico chromate: The National Lead Co., New York, conceived a new principle in pigment production whereby the necessary active protective ingredient was chemically and securely bonded to the surface of an in-

PREVIEW OF O.C.C.A. EXHIBITION

active core thereby eliminating loss of protective ingredients through being buried in the pigment particle. Pigment particle coating permits the use of low specific gravity materials as the inert particle core produces much higher bulking values than previously. This means that the active materials will be distributed over a much larger volume. M-50 is such a pigment and consists of a core of silica bound chemically by its outside surface with pure basic lead chromate. Paints made with M-50 are said to be easy to tint and have excellent chalk resistant qualities giving exceptionally good tint retention. Thus this combination of ease of tinting and tint retention enables finishing coats as well as prime coats to have an anti-corrosive action.

Bentone: This range of organic gelling agents continues to find extending application in the surface coatings industry and the uses of the three available grades will be demonstrated. Examples will include a bitumen coating containing Bentone 34, which will not flow at any temperature.

Ben-a-gel: This inorganic, soluble and predictable gelling agent for water systems has a number of advantages in water-based industrial primers, which include viscosity stability, excellent pigment suspension, quicker water release than water soluble thickeners and improved film adhesion properties. (Stand 37.)

Advances in Surface Coatings

This year the main theme of the exhibit of **A. Boake, Roberts and Co. Ltd.**, Carpenters Road, London E.15, will be the further advances made in the applications of ABRAC 'A' (epoxidised vegetable oil) in surface coatings. The following topics will be given prominence.

ABRAC 'A' in nitrocellulose lacquers: The use of ABRAC 'A' in conjunction with nitrocellulose and a butylated urea-formaldehyde resin has been shown to give lacquers with improved gloss, solvent resistance and adhesion to various substrates.

Anticorrosive finishes: The use of ABRAC 'A' in red lead anticorrosive primers has been shown to minimise the defects caused by the too rapid application of further coats of paint and it is claimed that its presence ensures satisfactory anticorrosive properties under these conditions. It is proposed to illustrate these points with various test panels.

ABRAC 'A' in alkyds: Attention will be drawn to the use of ABRAC 'A' in medium and long oil alkyds to give improved gloss and rate of drying. In particular, the shortening of processing times brought about by the use of ABRAC 'A' will be featured, with special emphasis on its use in alkyd manufacture in conjunction with the cheaper semi-drying oils.

ABRAC 'A' in epoxy resins: Further information will be available on the use

of ABRAC 'A' as a modifying agent for epoxy casting resins, with particular emphasis on its use to produce less costly products.

P.V.C. coated steel: Apart from the above topics, a small section of the exhibit will be devoted to the use of ABRAC plasticisers and stabilisers in the formulation of p.v.c. compounds for coating steel and will show the advantages to be gained by the use of triethyl phosphate for this purpose. (Stand 71.)

Protective Colloids in Paints

Products featured on the stand of **British Celanese Ltd.**, Hanover Square, London W.1, will include Celacol-methyl cellulose (M.C.) and Courlose-sodium carboxymethyl cellulose (S.C.M.C.).

The exhibit will illustrate the use of S.C.M.C./M.C. mixtures as thickeners and protective colloids in emulsion paints, and the effects of certain bactericides and fungicides on viscosity.

The effect of using S.C.M.C./M.C. mixtures in such factors as viscosity stability, colour stability and tropical storage characteristics will be shown.

Reference will also be made to other products available for the paint and allied industries, namely, cellulose acetate, trichlorethylphosphate and vinyl acetate monomer. (Stand 39.)

Developments in Oleochemicals

Recent developments in the field of oleochemicals, arising from investigations carried out in the BOCM laboratories, will provide the main theme of the exhibit of **The British Oil and Cake Mills Ltd.**, 2 Kingscote Street, London E.C.4. Special attention will be given to those products which would appear to be of interest to the surface coatings industry, including Trokene, which was featured at last year's exhibition. Some possible applications of this material will be demonstrated, and it will be shown how a new grade now being developed can be used with advantage where speed of drying is of importance. The versatility of the reaction will be demonstrated by a range of products made from a number of different raw materials on the laboratory scale.

A section of the stand will be used to display some of the more conventional products supplied to the paint and varnish industry, and especially to demonstrate the quality of the company's refined oils. (Stand 57.)

Synthetic Resin Emulsions

Results of recent development work on the Vandike range of synthetic resin emulsions will be shown by **British Oxygen Chemicals Ltd.**, Bridgewater House, Cleveland Row, London S.W.1.

The ease of application of emulsion paints and the appearance of the finished coating depend primarily on the changes in viscosity of the paint during and after brushing, the degree of absorption by the substrate, and the rate of drying of the

paint film. The exhibits will illustrate methods developed for examining these three factors and the value of these techniques in the study of the application properties of emulsion paints will be shown.

The effect of submitting paints to high shear (colloid mill) and their behaviour after shearing will be illustrated. Graphs will show the effect of shearing on paints and the subsequent rate of recovery of viscosity.

The degree of absorption by a porous substrate is determined by spotting the paint, diluted one to one with water on to filter paper. The radial spread of the paint and aqueous phase can then be observed. The rate of evaporation of water from various paint systems has been studied by casting paint films of standard thickness on polythene. (Stand 34.)

Qualities of New Alkyd Resin

The new vinyl toluenated long oil alkyd resin, Epok A.1620/75, will be prominently displayed on the stand of **British Resin Products Ltd.**, Devonshire House, Piccadilly, London W.1, along with other Epok resins which are extensively used by the surface coating industry.

This resin, which is said to possess outstanding salt spray and corrosion resistance combined with excellent fast drying characteristics, is particularly suitable for the formulation of paints and red oxide—zinc chromate primers for marine and industrial finishes.

Agricultural and machinery enamels, dipping and spraying finishes, based on Epok A.1620/75, possess good flow properties, retain their gloss and have a reduced tendency to bloom.

High quality aluminium finishes based on various Epok resins are also exhibited. These have been produced in collaboration with another raw material supplier, the English Metal Powder Co. Ltd. (Stand 42.)

Hiding Power in Flat and Semi-Gloss Paints

In view of the interest aroused by last year's exhibit, the theme of the stand of **British Titan Products Co. Ltd.**, 10 Stratton Street, London W.1, will again be hiding power, but will be confined to flat and semi-gloss paints.

In the 1959 exhibit, nine extenders have been examined in conjunction with rutile titanium dioxide in flat oil paints and the marked influence of the extender on opacity has again been shown. In addition, an attempt has been made to determine an optimum level of titanium dioxide for use with each extender with a view to obtaining maximum opacity. Recommendations regarding the most suitable titanium dioxide/extender ratio for each combination are made, and the desirability of pigments close to the critical pigment volume concentration is again stressed. The most generally acceptable level seems to be a pigment volume concentration 5% below the critical level.

As well as these singly extended paints, a number of paints containing combina-

PREVIEW OF O.C.C.A. EXHIBITION

tions of extenders are shown. These have been formulated in order to obtain the most satisfactory colour, low angular sheen, can stability and enamel hold-out while maintaining the opacity as high as possible. The effect on opacity of tinting these paints is also shown.

Since the medium has a profound effect on the general properties of a paint, some paints have been prepared with a constant pigmentation but using different media. These have the effect not only of altering the sheen and enamel hold-out but also of changing the cost to a marked degree, and the economics of medium variation are considered. (Stand 22.)

Information on Nitrocellulose

BX Plastics Ltd., Higham Station Avenue, Chingford, London E.4, who have been manufacturing nitrocellulose since 1887, will be showing various grades available, and offering technical information and advice. They will also be showing terpene resin and diterpene. (Stand 21.)

New Epoxy Resins and Colours

The joint stand of **Rex Campbell & Co. Ltd.**, and the **Chemical Supply Co. Ltd.**, 7 Idol Lane, London E.C.3, features a new solvent, isobutyl acetate 80%, and a new plasticiser, epoxy plasticiser RC 1, in addition to new data on others. The advantages of using paraformaldehyde in the manufacture of amino resins are clearly set out. A number of new cadmium colours designed for use in paints are also displayed.

Products of interest announced since the printing of the official brochure are the Aroclor resins which are manufactured by Archer Daniels Midland Co. They are water-soluble products intended for industrial stoving finishes. Aroclor 304 is recommended for primers with good water and salt spray resistance, while Aroclor 1000 is said to have a performance in gloss enamels equal to a melamine/coconut alkyd system.

Two chemically treated drying oils with 'unique properties' are also introduced. Admerol 75 HVA is an ideal medium for aluminium paints; even after storage for one year, these paints are said to show no loss of brilliance. Varson is offered as a complete replacement for dehydrated castor oil, giving shorter varnish cooking times. (Stand 7.)

Advances in Refining Liquid Hydrocarbons

This is the centenary year of **Carlless, Capel and Leonard Ltd.**, Hope Chemical Works, Hackney Wick, London E.9, who are outlining their development as refiners of liquid hydrocarbons. Photographs will show old and new refining plants and illustrate advances in handling and transport. Special reference will be given to new products.

The rate of growth in the volume of the many types of hydrocarbons refined by the company will be shown graphically. As distinct from the company's

normal production of solvents and diluents for the surface coating industry they will give prominence to the company's progress in the chemical field with special reference to the production of dicyclopentadiene and others of the trimethyl benzenes. The molecular structure of some of these products will be illustrated with models. (Stand 72.)

Epoxy Resins for Surface Coatings

The **CIBA (A.R.L.) Ltd.**, Duxford, Cambridge, display will illustrate the properties and applications of the Araldite range of epoxy resins for the surface coatings industry. They include:

Araldite 820-RH: This is a two-part formulation, consisting of a resin and a hardener, for cold curing finishes, or alternatively for finishes that cure rapidly at elevated temperatures. Coatings based on Araldite 820-RH are recommended when rapidly drying coatings, possessing good chemical resistance, are required. These coatings may be clear or pigmented as desired and cure without blushing even at a high relative humidity. They are also free from such surface defects as cissing and pinholing and the cured coatings do not become brittle on ageing.

Araldite 982AB: There is a tendency to reduce stoving times in continuously-operating ovens by working at higher temperatures, and under these conditions it is essential to employ a finish which is tolerant to a certain latitude in curing conditions. Lacquers based on Araldite 982-AB have a relatively wide stoving range (3-15 minutes at 240°C or 40-80 minutes at 180°C). The cured lacquer films are tasteless and odourless and possess excellent resistance to acids, alkalis and solvents. They are recommended by the makers for the internal protection of metal containers, etc.

Araldite 6000 series: The 6000 series provides a range of four basic solid epoxy resins in order to give paint manufacturers wider scope in formulating their own epoxy finishes. Two of these resins are now available in solution form and are known as Araldite 6100/70 and Araldite 6300/50. (Stand 24.)

A New Thickener for Paint

Exhibiting for the first time, the **General Chemicals Division of Cyanamid of Great Britain Ltd.**, Bush House, Aldwych, London W.C.2, offer to the paint manufacturer products for use from the first to the final stages of paint formulation.

Monomers: Of these basic raw materials those well established (such as acrylonitrile and acrylamide) will be shown as well as the more recently developed compounds—diallylamine and methylene-bis-acrylamide. These monomers give opportunities for the designing of copolymers having special properties.

Polymers: Resins and emulsions with recommended formulations for modern finishes, such as Cyzac resins and Cyacua alkyd emulsion. These two products have recently been developed by Cyanamid. Cyzac resins having high impact resistance, oil and detergent resistance, and hardness, and in some cases flexibility. Cyacua alkyd emulsion is said to combine the advantages of the solvent type alkyds and the water-based latex systems and to provide an excellent flat interior coating.

Catalysts and curing agents for epoxy resins: A display of various polyamines. Substituted amines and melamine derivatives give improved properties to these versatile resins.

Additives for special purpose paints and lacquers: Additives from the new Cyanamid range will be shown—oil and water-soluble surface active agents including grades recommended for use in emulsion polymerisation: Cyasorb UV absorbers, UV9 and UV24; Accobond, a multi-purpose bonding agent, and triallyl cyanurate. Also displayed and completely new in the paint field, will be polyacrylamide, a water-soluble thickener and emulsion-stabiliser. Polyacrylamide enables heavier coats of more highly pigmented paints to be applied successfully.

Corrosion inhibitor: Guanylurea phosphate, which prevents rusting of the tin which holds the final product, will be exhibited. (Stand 9.)

Sample Quantities from D.C.L. of α -Methylstyrene

With isosebacic acid now available, the **Chemical Division, Distillers Company Ltd.**, Devonshire House, Mayfair Place, London W.1, have prepared a range of isosebacate esters parallel to their range of normal sebacates, namely, dibutyl, diisooctyl and di-2 ethyl hexyl isosebacates. These will be shown together with a new low temperature plasticiser, Bisoflex ODN, which is comparable in performance with the adipates.

Technical data and suggested uses will be given for α -methylstyrene, which is to be produced by **British Hydrocarbon Chemicals Ltd.**, and which is now available in sample quantities in one grade—AMS 98. The material will become available in commercial quantity during 1959 when two less pure grades will also be offered if required: AMS 80 containing 80% α -methylstyrene with cumene and polymers; and AMS 90 a polymer-free material.

For the AMS 98 grade, α -methylstyrene content is 98.5%; the product includes tert-butylcatechol inhibitor at 15 p.p.m. Freezing point is -22°C and the flash point (Abel closed cup) is 112°F.

Suggested uses include production of synthetic rubbers similar to GRS by emulsion polymerisation; copolymerisation with styrene to give copolymers with higher softening points than polystyrene; and copolymers with acrylonitrile, methacrylates, etc., to give plastics

PREVIEW OF O.C.C.A. EXHIBITION

with a wide range of properties.

Homopolymers of low mol. wt. such as the dimer, tetramer, etc., can be obtained by the action of sulphuric acid, aluminium chloride, active clays, etc., at room temperature or above. Polymers with an average of more than five units per molecule are solid; below this, oils of varying viscosity are obtained. Such oily polymers may be used as extenders in conjunction with standard plasticisers for softening vinyl resins, also adhesives, paints and other coatings.

Homopolymers of high mol. wt. are obtained by the action of ionic catalysts at temperatures below about -50°C . Mol. wt. and softening point increase as the polymerisation temperature is reduced; the softening point may exceed 200°C for polymers formed below -100°C .

α -Methylstyrene may be used with styrene to produce 'styrenated oils' for paints and other surface coatings.

This stand will also show an addition to the Bisol range of ester solvents, 80% isobutyl acetate, and a layout to show the use of carbon dioxide in providing an inert atmosphere in paint manufacture. (Stand 62.)

(Exhibits of Dunlop Composition Division are previewed in p. 467.)

Metal Soaps as Driers

Durham Raw Materials Ltd., 1-4 Great Tower Street, London E.C.3, will show the potentiality as driers of several of the lesser known metal soaps, such as barium, cerium, vanadium and zirconium by demonstrations in various typical paint media for both air drying and stoving systems. New grades of high concentration liquid octoates will also be shown.

An illustrated account will be given of fundamental work on the resistance to fungal growth of various white pigments, extenders and basic paint media, as a guide to optimum formulation of fungicidal paints. In particular, examples will be given of the marked effect of zinc oxide in enhancing the efficiency of the mercury fungicide, Nuodex 321 Extra.

New data will be presented on the use of precipitated calcium silicate (Tufknit C.S.) as a paint component and also on the use of zinc dust in zinc rich paints. (Stand 20.)

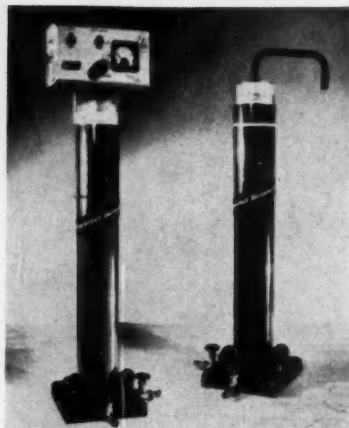
Improved Equipment for Deionising Water

The Elgastat Major Mark II equipment for producing deionised water will be shown by Elga Products Ltd., Railway Place, London S.W.19.

The Major Mark II is developed from the Elgastat Major. The following improvements are incorporated:

All exposed components are now made from corrosion-resistant plastic.

Flow rates: equilibrium water (4 megohms/cm²) may now be drawn at the rate of up to 10 gallons (45 litres) per hour. Distilled quality water (500,000 ohms/cm²) can be drawn at the rate of 20 gallons (90 litres) per hour.



Elgastat Major Mark II

Two versions are available: Where the requirements are, in the main, for commercial grade distilled water, a capacity and exhaustion indicator is incorporated. (Type B.104.) For critical applications, a conductivity monitor forms an integral part of the unit, and gives an accurate quality check throughout the exhaustion cycle. (Type B.104, CON.)

A standard modification makes it possible to pipe deionised water to any number of draw-off points. In common with all Elgastats, no regeneration *in situ* is necessary. (Stand 14.)

New Equipment Includes Plastic Stopcock

New exhibits on the stand of H. J. Elliott Ltd., E-Mil Works, Treforest Industrial Estate, Pontypridd, Glam., will include Treamic brands of pipettes, etc., with fused ceramic graduations and figures.

They will also show the new E-Mil plastic stopcock fitted to burettes. This stopcock is made from p.v.c. tubing with h.d. polythene housing and is substantially unbreakable. Almost every fluid, gas and air transmission can be handled by the stopcock, which, it is claimed, will not bind or freeze and is ideal for caustic solutions.

The E-Mil safety pipette with the E-Mil plastic adaptor enables the user to use a standard syringe, luer or record fitting, and it is interchangeable for any size of pipette. The pipettes are fitted with a standard ground glass socket to fit the adaptor. The clearly etched graduations are filled with fused enamel that is highly resistant to chemical action acids, alkalis and solvents. (Stand 11.)

Aluminium Alcoholate for Heat-resistant Paints

Aluminium alcoholate, marketed by Leon Frenkel Ltd., 28a Basinghall Street, London E.C.2, as Ennogela for use as a gelling agent, will be shown as a material for incorporation in heat-resist-

ant paints, as a result of recent work. New long oil decorative alkyds, a field which the company entered fairly recently, will also be featured, as will new additions to their range of alcohol soluble resins.

Both saturated and unsaturated fatty acids produced with a high degree of purity by the Littleborough plant of Hess Products Ltd. will be featured. Visitors will also learn of laboratory work by the Walker Extract and Chemical Co. Ltd., Bolton, undertaken to provide a comparison of the relevant properties of pentaerythritol in terms of alkyd resin manufacture, of mixtures of mono- and di-pentaerythritol. (Stand 64.)

Geigy to show Many New Developments

The special features of the Geigy phthalocyanine blue, their excellent texture and ease of dispersion, are a new development in this field and will be shown by The Geigy Co. Ltd., Rhodes, Middleton, Manchester. The exhibit will illustrate these, drawing attention to the brilliant shade and non-flocculating properties of Irgalite fast brilliant blue GS.

A new range of pigment dispersions for the simple coloration of aqueous flexographic inks will be introduced under the designation Irgalite SGP colours. These will make available to the flexographic ink maker brilliant shades not easily obtainable with other Geigy pigment powders. Work has continued on the production of easily dispersible pigments for flexographic and gravure inks, and the latest developments of toners will be displayed.

The exhibit will also illustrate the results of new work on the special requirements of paint formulators in relation to high temperature stoving and chemical resistance; and new additions to the Irgalite SPV range of aqueous pigment dispersions for emulsion paints. (Stand 47.)

Automatic Control of Solvents

Brodie-Kent meters for the automatic control of all solvents and media are to be featured by Gilbarco Ltd., 740 High Road, Tottenham, London N.17. These meters, equipped with presetting counters and valves, are particularly suitable for batching operations. Under consistent operating conditions accuracy of the order of $\pm 0.1\%$ is achieved; and since these instruments feature a built-in adjustment mechanism, calibration to within very fine limits can be effected.

In addition, auxiliary equipment in the form of strainers, air eliminators, flow control valves, etc., will also be shown. For certain work, meters to copper-free and non-ferrous specification can be supplied. Remote control equipment to operate in conjunction with Brodie-Kent meters will be exhibited. (Stand 77.)

Goodyears Solution Binder for Multi-colour Paints

Pliolite V-T multicolour paint will be exhibited for the first time by Goodyear Tyre and Rubber Co. (Great Britain) Ltd., Wolverhampton.

PREVIEW OF O.C.C.A. EXHIBITION

The increasing popularity of 'polka dot' or 'speckled' coatings reflects the significance of this revolutionary coating material which produces a multicolour paint in one spray operation. The paint consists of two phases—a lacquer phase in which pigments are dispersed, and a water phase containing water and a protective colloid. The lacquer phase is poured into the water phase during agitation. Due to the incompatibility of the two systems, small globules or flecks of lacquer are formed.

Pliolite V-T, developed specifically and widely used as a solution binder for multicolour paints, is a lacquer-type drying resin soluble in mineral spirits. This chemical is said to give paints the distinct advantages of low odour, use of economical solvents, excellent pigment binding, non-lifting properties, high flash point and good alkali resistance. This vinyl-toluene-butadiene resin, of a thermoplastic nature, enables the manufacture of films of unusual clarity, strength, hardness and chemical resistance. These films are formed by evaporation of solvent, and not by oxidation.

Pliolite S-5, styrene/butadiene, thermoplastic resin, soluble in aromatic solvents, will also be displayed. One of its outstanding properties is said to be its chemical resistance. Coatings based on this resin make it possible to paint most types of masonry surfaces with no fear of paint failure, including alkali attacks. These coatings offer protection to floors, as well as structural steel, machinery and plant where spillage of chemicals presents a corrosion problem. (Stand 25.)

Development Products from Nobel Division

Three divisions of **Imperial Chemical Industries Ltd.**—Dyestuffs, Heavy Organic Chemicals and Nobel—will share a stand. *Dyestuffs Division* will illustrate a number of new dyestuffs, pigments and resins for the paints, plastics and allied trades, including Monastral fast blue RFS, an important new pigment possessing good non-flocculating properties.

Monolite fast violet RS, a new pigment characterised by high light fastness and attractive shade at low concentration, will be among other pigments to be featured. Modulac 147W, a new resin for use in glossy thixotropic paints, will be on show in the resins section, while two new products, 3X and 5X, in the Bedacryl range of vinylated alkyds will be featured. These products have high gloss and build and dry swiftly.

Nobel Division will show new and improved silicone resins for heat resistant paints, which illustrate the effect of prolonged heating at high temperatures on silicone and conventional paints. Two development products, trimethylol propane and neopentyl glycol, will also be seen. Trimethylol propane is used in the preparation of short-oil alkyd resins for stoving enamels, while neopentyl glycol

is used in the production of esters, polyester resins and plasticisers.

Heavy Organic Chemicals Division is to feature high-purity terbutol (*p*-tert-butylphenol), an intermediate for reactive and non-reactive varnish resins. The exhibit also covers octylphenol, another resin intermediate, and the comprehensive range of solvents made by the division for the surface coating industry. (Stand 18).

Drying Oil Research

This year some results of investigations in three different fields of drying oil research will be shown by **John M. Hamilton & Co. Ltd.**, Humber Oil Works, Wincolmlee, Hull. A factor influencing the properties of alkyd resins, stand oils, modified oils, etc., is the degree of refining of the drying oil used for the manufacture of such media. In comparing the properties of Canadian and Indian linseed oils, the influence of naturally occurring impurities on the processes of oxidation and thermal polymerisation will be stressed. In this connection reference will be made to a number of processed linseed oils manufactured by the company, from crude, degummed, and alkali refined linseed oils.

The viscometric properties of the various grades of linseed stand oil have been further studied and new information on viscosity-temperature relationships and solution viscosity characteristics will be shown.

A new range of oil modified Epikote resin ester varnishes has been developed. Attention will be drawn to the use of a linseed oil modified epoxide resin ester, as an intermediate for the manufacture of long oil varnishes. The tung oil modifications are particularly interesting and information on their preparation will be displayed. (Stand 17.)

Asbestos Fibre and Diatomite Filter Aids

Stand of **Johns-Manville Co. Ltd.**, 20 Albert Embankment, London S.E.11, will be devoted to two main groups of diatomite products, namely, their filter-aid

group and the mineral filler section. The pure Celite diatomaceous filter-aids are now completely supplemented by a whole range of Fibra-flo grades which consist of a mixture of asbestos fibre and diatomite. These latter grades are particularly useful in the precoat of large metal screen-type filters and may also be used on rotary precoat filters to prevent slip of the filter-cake, etc.

In the mineral filler field, **Johns-Manville** will show those grades of Celite which can be used as flattening agents or pigment extenders in paint formulations.

Calflo, a synthetic calcium silicate, will be featured for its excellent hiding power when incorporated into p.v.a. emulsion paints. This versatile material has also been used for the preparation of many concentrates when it is an advantage to have liquids or viscous substances in the form of free-flowing powders. Illustrating this will be a range of samples covering lecithin, rubber antioxidant, and candy. Calflo has also found use as a carrier absorbent in the insecticide field and shown very high anti-caking properties when used in small percentages in those products which have a tendency to cake.

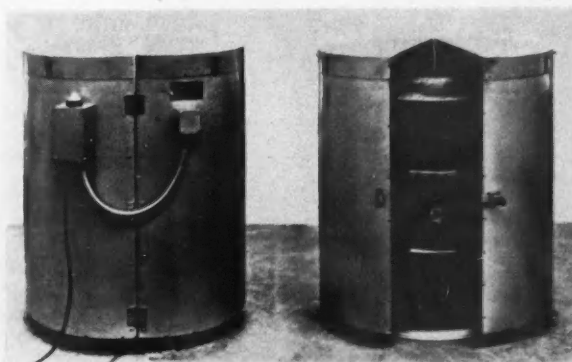
A range of diatomite aggregates suitable for the packing of chromatography columns will be featured. (Stand 65.)

Isomantle Drum Heater

Electric surface heaters for the chemical and allied industries will be a feature of the display by **Isopad Ltd.**, Barnet By-Pass, Boreham Wood, Herts. Isomantles for drums facilitate emptying of viscous or solidified material and these drum heaters are now available with a heated top section as shown. They are made for all standard drum sizes in vertical or horizontal positions.

All Isopad equipment is available in a special flameproof construction utilising metal sheathed heating elements, flameproof terminal boxes and controls. Isotapes, electric heating tapes, will be shown including new types for frost protection.

On the laboratory side a new unit for semi-micro analysis combining heating mantle and control, an inexpensive new



Isopad drum heater

PREVIEW OF O.C.C.A. EXHIBITION

type of heating tape, as well as examples of the popular multisize isomantles (one heating mantle for several flask sizes), and extraction units will be shown. (Stand 8.)

Latest Kek Mills have New Type of Drive

Two new KE Kek mills will be shown for the first time by **Kek Ltd.**, Palmerston Street, Ancoats, Manchester 12. These are the 4B mill and the 3B mill. Both incorporate a new type of belt drive representing a complete break with the geared type of pulveriser previously made by this company. Due to economies in power consumed by the drive, the new mills are said to show a 20% increase in output/h.p. when compared with their predecessors.

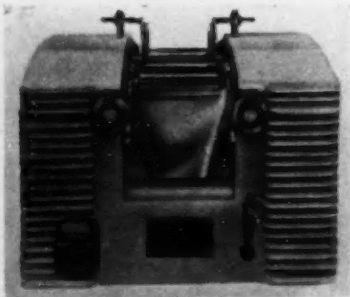
Maintenance has been simplified and of particular interest to manufacturers of organic chemicals, synthetic resins and synthetic pigments will be the modest temperature rise of the B series pulverisers when operating. Epikote lining of the recently developed involute delivery rings has also greatly aided cleaning of the mills.

The No. 4 mill will be seen fitted with Gravier explosion suppression equipment which ensures that in the event of an explosion the pressure generated would not exceed 1.3 p.s.i. The equipment comprises a hemispherical suppressor, $\frac{1}{2}$ in. high-rate discharge bottle, explosion detector and an electrical power unit. Rapid injection of suppressant from the hemisphere and bottle prevents the explosion from developing. The system is self-checking and in the event of circuit failure, audible and visible alarms are given.

Gravier equipment on mills is used in connection with a variety of products including phenolic resin, sulphur, cellulose acetate, and other materials which burn quite slowly when in bulk, but which as a powder or dust in suspension will explode and generate pressures of between 40-60 p.s.i. (Stand 58.)

New Triple Roll Mills

The new Marchant triple roll mills, which will be on view have many applications in industry, and are the culmination of many years' experience and incor-



Marchant triple roll mill

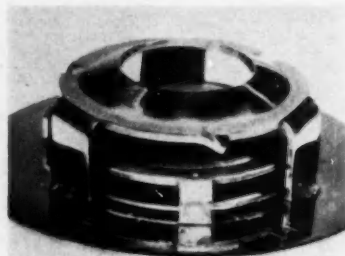
poration of up to date design results in efficient, easy to clean and well finished machines. **Marchant Brothers Ltd.**, 60 Verney Road, London S.E.16, state that design features include readily cleaned hopper cheeks, enclosure of the electric, watercooling via rotary valves with visual nylon service tubes that ensure a check of water flow and detection of foreign matter.

Machines are finished in blue enamel with chromium plated fittings. Among the mills available are models 3 in. diameter by 6 in. long; 6 in. diameter by 12 in. long; and 6 in. diameter by 16 in. long.

Also on display will be a small mixer of 10 to 28 gall. capacity. A chain-driven model, fitted with safety switches, this machine is used in the mixing of heavy glutinous compounds. (Stand 36.)

New Glitsch Ballast Tray

To be introduced to the chemical and plastics industries on the stand of **Metal Propellers Ltd.**, 74 Purley Way, Croydon, Surrey, sole British makers of Glitsch 'truss-type' bubble cap trays, will be the new Glitsch ballast tray. This is



Except for the disc, which represents the floor of the tray this Glitsch tray is shown just under its real size of 2 in. wide by $\frac{3}{4}$ in. high

described as a bubble cap tray in which the cap and riser assembly is replaced by a unit (illustrated) producing constant vapour velocity through a variable annular slot.

It can also be classed as a sieve tray with apertures which are sealed at zero vapour rates. In fact, it is said that the ballast tray incorporates the virtues of both bubble cap and sieve trays, without acquiring their weaknesses. In this new design of low-cost tray, high efficiency is combined with high capacity and good flexibility.

Operating tests have shown that the efficiency of the tray at very low vapour rates up to moderate vapour rates is extremely high and that a turndown ratio of up to 9:1, and better, is obtainable. (Stand 63.)

Matthey Cadmium Pigments

In the production of cadmium pigments, **Johnson Matthey and Co. Ltd.**, 73-83 Hatton Garden, London E.C.1, take care to ensure the highest possible

standard of consistency of colour and brilliance from batch to batch. The success of this rigorous production control will be demonstrated by means of a graph showing reflectance curves for four samples taken from different bulk batches of pigments. Though absolute identity of colour and brilliance is difficult to achieve, the curves will show how minor are the variations. These reflectance curves—the first stage in assessing a colour—will be associated with a chromaticity diagram giving exact colour values. Other reflectance curves will show how accurately colour matchings can be made in the company's laboratories.

An excellent dispersion in a paint medium can be achieved with a short milling cycle. By virtue of the soft texture of the pigments there is, in fact, a danger that brilliance may be reduced if the milling time is longer than is necessary. This undesirable effect will be demonstrated by means of panels coated with paints milled correctly and for an unnecessarily protracted period. (Stand 59.)

High-Speed Mixer-Dispenser

Prominent among the exhibits of **Mill Room Accessories and Chemicals Ltd.**, 15 Albemarle Avenue, Withington, Manchester 20, will be the Rotamix, which is a balanced high-speed mixer-disperser capable of dealing with the dispersion of materials ranging from soft alkyds and hard resins to cellulose chips and pigments.

The Rotamix is manufactured in a wide range of sizes from $\frac{1}{2}$ h.p. to 20 h.p. motive power. Double speed machines allowing slow and fast action with the same machine are also available. Normal construction is mild steel with a cast turbine, but stainless steel can also be supplied where necessary.

Mill Room Accessories and Chemicals Ltd. also supply ball mills in sizes from 7 ft. dia. downwards lined in Silex, porcelain or Steatite according to requirements. Laboratory mills using the cradle or the roller principle are included in the range.

High speed dispersion mills manufactured by Fryma are available. Output of these compact machines ranges from 10 lb. per hour to 8,000 lb. per hour according to the size of the machine and material to be ground. (Stand 3.)

New Uses of Mica in Road-Marking Paints

Results of recent investigation into the use of micas in road-marking paints will be shown on the stand of **Micafine Ltd.**, Raynesway, Derby.

The two types investigated are those for tar macadam, where bleeding is possible, and those for concrete, where alkali resistance is important. The former have been based on the conventional spirit manila resin and the latter on non-saponifiable resins such as isomerised rubber and styrene-butadiene resins.

In the plasticised spirit manila types in

PREVIEW OF O.C.C.A. EXHIBITION

particular, micas have been found to improve flexibility, adhesion and wear resistance.

Interesting results have been seen concerning the effect of P grade mica on the opacity of white pigmented p.v.a. emulsion paints. Additions of 10-20 per cent of mica based on the main opaque pigment are widely used in order to achieve improved scrub resistance, scratch resistance, and adhesion, but recent experiments appear to indicate that still larger additions of mica are possible without materially affecting opacity. This may provide a means of making these paints more cheaply, and the explanation for this may be found in the optical properties of the mica flakes.

Surface treatment of pigments has been increasing in favour in recent years as an aid to dispersion by grinding, and recent research has provided a means of greatly facilitating the ease of dispersion of mica. Samples of treated mica have been produced with which, in oleo-resinous media, dispersion by simple mixing is possibly as good as that obtained with untreated mica after several hours of ball milling. (Stand 56.)

Anhydrides for Paint Industry

The main features of the display of **Monsanto Chemicals Ltd.**, 10-18 Victoria Street, London, S.W.1, will be phthalic anhydride and maleic anhydride, two of the most important raw materials for the paint, varnish and lacquer industries. A range of end products stemming from derivatives of these materials will be shown.

Other Monsanto products on display will include sodium benzoate, a corrosion inhibitor, and Santobrite (Monsanto pentachlorophenate), which protects surface coatings from attack by fungi and bacteria. (Stand 41.)

Improved P.V.A. Copolymer Emulsions for Paints

National Adhesives Ltd. (Resin Division), Slough, Bucks, are convinced that superior paints are possible using copolymers of vinyl acetate in place of the older homopolymers. They have been manufacturers of p.v.a. for their own adhesives and coatings for some years and decided to apply their adhesive and coating theories to p.v.a. in the paint field.

They offer proof of their theories in a variety of water-paint formulations which are intended not only to improve present p.v.a. paints but, most important, to expand their use into wider painting fields.

Painting over chalking surfaces has always been a problem, but it will be shown that this can be easily overcome with a copolymer resin base. An allied additional use for vinyl acetate copolymer paint is as a thick slurry intended for dual purpose crack-filling and priming of walls, exterior and interior, before painting with p.v.a. paint.

Newer copolymers presented include borax compatible grades with acceptances

up to 60% pigment volume without loss of quality, opening up the possibility of true one-coat p.v.a. paints.

The copolymers offered for sale and development are claimed to cost no more in use than normal p.v.a. emulsions, and to have additional wide applications in the adhesive, paper, textile and other fields. (Stand 6.)

'Tree' Shows By-Products of Coal Tar

An illuminated 'by-products tree' which outlines the flow of the primary and secondary by-products obtained from coal and shows some of the industrial and household articles manufactured indirectly from coal tar by-products will be the main feature of the stand of the **National Coal Board**, Hobart House, Grosvenor Place, London, S.W.1.

The exhibit also includes typical tests of the standard benzole fractions produced by the N.C.B. coking plants. In addition, illuminated gas liquid chromatographic charts will be displayed illustrating the purity of these products, i.e. nitration grade toluol, 90's toluol, 2/3' xylol and 3/5' xylol, 96/160 and 90/190 naphtha. (Stand 75.)

Peroxides as Catalysts in Curing of Polyester Resins

Exhibits by **Novadel Limited**, St. Ann's Crescent, Wandsworth, London, S.W.18, will be mainly devoted to the use of organic peroxides as catalysts applied to the curing of surface coating polyester resins. Examples of recent improvements relating to various peroxides in this application will be shown.

A further important group of products shown are Synouryn dehydrated castor oil in various viscosities and Synouryn distilled fatty acids 'S'. Illustrations of the application of these in alkyl resins, epoxy esters and their styrenated derivatives will be shown with details of the latest developments.

Others of the company's products, such as white lead, lead stabilisers, epoxidised vegetable oil stabilisers, Isol anti-skinning agents and Siccatal driers will also be included in the exhibit with illustrations of their properties and applications. (Stand 5.)

New Styrene Modified Alkyl Resins

Among new products to be shown by **Piastanol Ltd.**, Crabtree Manorway, Belvedere, Kent, is Plastyrol S-30X, a styrene modified alkyl which is now in bulk production. This resin has the following composition: fatty oil content 37%, fatty oil type linoleic-rich phthalic anhydride content 19%, vinyl content 36%.

This resin has been formulated primarily as a base resin for both stoving and air drying industrial finishes where rapid development of hardness and film resistance is of prime importance. It also

forms a useful base for quick air drying and stoving primers, undercoats and surfaces where good resistance to water during the "flattening" stages is an essential property. Interesting coatings based on blends of this resin with nitrocellulose may be formulated and the resin itself forms a useful base for wet-on-wet methods of application.

Vinyl toluene modified alkyls, which possess properties similar to styrenated alkyls but which have the added advantage of being soluble in aliphatic solvents, are also being shown. Another new product is long oil soya modified alkyl, similar in general properties to the well-established plastokyd 704W but possessing better colour retention. This resin does not exhibit the poor drying and surface defects which have been associated with this type of alkyl when dried under adverse conditions. (Stand 17.)

Emulsions for Coatings and Paints

Some of the results of research by **Plastic Products Ltd.**, 2 Caxton Street, London S.W.1, during the past 12 months will be seen on their stand. Work has been done on coatings for paper and boards, emulsions have been formulated for machine coating on to board to withstand oil, grease and fats and special emulsions for adhesives have been developed. Work has also continued on p.v.a. emulsions for paints. A range of Cellosolve methacrylate solutions for use in flexible lacquers for rubber and p.v.c. will be shown.

On the same stand **R. H. Cole and Co. Ltd.** will show a new Steatite laboratory pot mill with special quick-release lid and latest developments in the production of high-density Steatite mill balls and mill lining blocks.

Petroleum, substituted styrene and other resins for metallic paint media, textile finishing, paper coatings, heat seal and hot melt adhesives will be shown. Other exhibits will include high-quality grades of coumarone-indene resins and latest developments in regard to temperature-indicating crayons and colours. (Stand 76.)

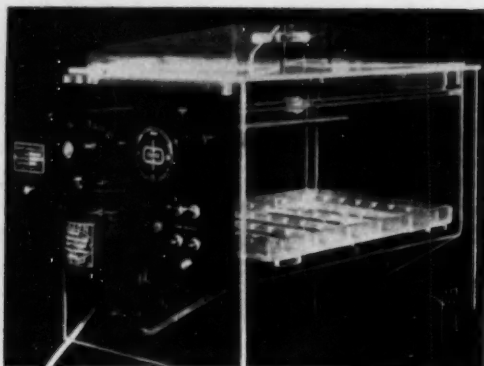
Paint Mills

The stand of **Premier Colloid Mills Ltd.**, Hershams Trading Estate, Walton-on-Thames, Surrey, shows 3-in. and 6-in. size Premier paint mills for the manufacture of industrial and decorative finishes as well as undercoats, emulsion paints, gelly paints and distempers. The exhibit is designed to show not only the variety of products which can be produced with this equipment, but also the economies which can be made in production. (Stand 19.)

New Plant for Fatty Acids

This year **Price's (Bromborough) Ltd.**, Bromborough Pool, New Ferry, near Birkenhead, will commence operation on a plant for the production of a range of low molecular weight fatty acids. It

PREVIEW OF O.C.C.A. EXHIBITION



Corrosion cabinet by Research Equipment (London) Ltd. is made from acrylic material. Internal working space is about 16 in. by 10 in. by 7 in.

is felt that these will be of interest to manufacturers of non-drying alkyd resins which are used as plasticisers for urea formaldehyde resins for use in white stoving finishes.

Caproic acid (C_6), caprylic acid (C_8) and capric acid (C_{10}) all of which have a purity of over 90% will be offered. Pilot plant quantities of these three acids are available for examination.

Cyclopentanone, which was first offered for sale in bulk quantities towards the end of 1958 will also be exhibited.

A new plant employing the soda saponification technique for the production of castor fatty acids has been brought into operation since the last exhibition. The range of products from this plant will be of interest to manufacturers of alkyd resins. 12-hydroxystearic acid (hardened castor oil fatty acids), technical ricinoleic acid and tung oil fatty acid will all be exhibited. (Stand 4.)

Device for Minimising Ink Fly

The Printing, Packaging and Allied Trades Research Association, Randalls Road, Leatherhead, Surrey, will show equipment used in the laboratory for studying various aspects of ink behaviour. Of special interest will be a laboratory-scale device for minimising ink fly which operates on the principle of air jets blowing the ink particles back into the nip region.

Another exhibit likely to arouse interest will be a working demonstration of equipment in which transparent rollers are used for observing the behaviour of ink films in the nip. Weissenberg's phenomena of visco-elastic effects with media common to both printing inks and paints will also be demonstrated. (Stand 52.)

Corrosion Cabinets for Use with Sulphur Dioxide

In addition to their standard range Research Equipment (London) Ltd., 64 Wellington Road, Hampton Hill, Middlesex, will exhibit two corrosion cabinets

for use with sulphur dioxide and other gases.

These cabinets are of similar design to those used for salt spray tests, but have thermostatically controlled heaters and circulating fans incorporated in the construction. (Stand 40.)

Developments in Pigment Dispersion

Last year Reeves and Sons Ltd., Lincoln Road, Enfield, Middlesex, introduced their range of pigments dispersed in various media. Work has continued by the pigment laboratory staff to improve and increase the range and application of colours available in this form.

A new range of translucent pigments dispersed in a polyester resin has been made available and will be shown as part of the stand design. These pigments are primarily for use with reinforced plastic roof lights. They show remarkable fastness to light even when used in low concentration.

Work has also been carried out to improve the range of colours available for p.v.c. pastes, especially colours to B.S.S.

Since the last exhibition the company has carried out research into methods of dispersion. Investigations, both in this country and abroad, have been made in an endeavour to obtain the most up-to-date methods and plant which will produce pigment dispersions of the highest possible order. (Stand 27.)

Colour Measurement and Matching

Instrumental colour measurement and some of its applications to industrial colour matching will be illustrated on the stand of the Research Association of British Paint, Colour and Varnish Manufacturers, Waldegrave Road, Teddington, Middlesex. The basis of all such work is that by reason of the trichromatic properties of the eye, any colour can be matched by additive mixture of three primary lights, a fact which will be demonstrated.

The international (C.I.E.) system for colorimetry is based on the average

colour response of the normal eye.

Colour measurements can be carried out by photoelectric means, provided that the response of the instrument to different parts of the spectrum is arranged to match the response curves of the eye. (Stand 54.)

Products for Surface Coatings by Shell Chemical

The theme of the stand of the Shell Chemical Co., 15-17 Great Marlborough Street, London, W.1, will be 'Shell products for the surface coating industry'. The latest developments in the study of solvent systems for applying protective and decorative coatings on metal will be illustrated.

Space will be devoted to a demonstration of results achieved in development work at Shell's Egham technical service laboratories with the Shell range of ketone, alcohol, ether and glycol ether solvents, with special reference to solvent formulations suitable for use with acrylic resins.

Two newer applications for Epikote resins will be featured—Epikote resin-based car primers and Epikote resin/coal tar systems. (Stand 33.)

Sturge Precipitated Calcium Carbonate

Latest grades of Sturge precipitated calcium carbonate which offer the following properties: surface coated or uncoated; low, medium and high oil absorption; ultrafine, fine and medium particle size; and which are supplied in either powder or water paste, will be featured by John and E. Sturge Ltd., Wheleys Road, Birmingham 15.

Trade names are Calofort, Calopake, Sturcal and Calofil and these grades are used as extenders in the production of printing inks. Some of the Calofort grades are available in water-paste form for the preparation of inks by a flushing process.

In paints, the ultrafine coated Calofort S and T are used to prevent settlement and are said to be effective even in the presence of heavy pigments such as red lead. The same grades can be used to overcome flotation problems.

Calopake F is an effective flattening agent and improves the colour of titanium dioxide. Another Sturge product, citric acid, is used in the production of resins and plasticisers. (Stand 49.)

Union Carbide to Show Products for Fawley

The main products to be produced at the Fawley plant of Union Carbide Ltd., 103 Mount Street, London W.1, when it comes into operation will be featured by this company, including the non-ionic grades of Tergitol surface active agents. These are NP-14, NP-27, NPX, NP-35 and NP-40, which are all polyethylene glycol ethers.

Glycols scheduled production is for

PREVIEW OF O.C.C.A. EXHIBITION

ethylene, diethylene and triethylene glycol and all the polyethylene glycols in the Union Carbide Carbowax range, except methoxy p.e.g. In alkanolamines, the U.K. plant will produce mono-, di- and tri-ethanolamine.

Production of glycol ethers will be of the Cellosolve and Carbitol ranges. The Carbitol solvent is diethylene glycol monoethyl ether; butyl Carbitol is a colourless liquid with a slow evaporation rate and is a solvent for nitrocellulose and many other resins. Methyl Cellosolve, with the most rapid evaporation rate and the lowest boiling point of the range of glycol-ethers, is a medium-boiling solvent for nitrocellulose.

Cellosolve, said to be an excellent solvent for nitrocellulose and alkyd resins, has a mild odour and a low evaporation rate. As a lacquer solvent it contributes gloss and improved flow-out and it will tolerate a dilution of 5 parts to 1 with toluene.

When used in lacquers, the slow evaporation rate of butyl Cellosolve aids blush resistance and improves gloss and flow-out. An effective viscosity-reducing agent for alkyd baking enamels, it is also finding use in quick-drying varnishes and enamels. When used to the extent of 10% with petroleum hydrocarbons it is an excellent thinner for these varnishes.

Another product not due for production at Fawley, but which will be shown on the stand, is Cellosize hydroxyethyl cellulose. (Stand 1.)

Developments in Polymers by Vinyl Products

An exhibit of decorative emulsion paints by **Vinyl Products Ltd.**, Carshalton, Surrey, will show that water spotting can be substantially overcome by basing emulsion paints on the new vinyl acetate-vinyl stearate copolymers now in their final development stage. Another display will illustrate the importance of low temperature film formation on the performance of pigmented emulsions as sealing coats; it is also to be shown that the drying oil compatibility of the vinyl acetate-vinyl caprate copolymer emulsions makes it possible to formulate sealers of greatly improved binding properties for powdery surfaces.

An acrylic lacquer finishes exhibit will feature the development of a special methacrylate terpolymer for air-drying and forced-drying automotive finishes. The presence of carboxyl groups in the terpolymer improves pigment dispersion and gloss, while copolymerisation with higher alkyl methacrylates confers internal plasticisation; the new terpolymer has good petrol resistance and is compatible with polymethyl methacrylate and nitrocellulose.

For floor maintenance products two new Vinamul emulsions, based on modified methacrylate and styrene copolymers, will be shown for the first time.

New products to be announced include

a fine particle size, yet highly concentrated, polyvinyl acetate emulsion for the formulation of gloss paints; an alkali-soluble internally plasticised terpolymer emulsion for leather finishing; a non-volatile syrup of polyvinyl caprate which is suggested for use in metal casement putties, and an ethanol solution of a vinyl acetate-vinyl benzoate copolymer which has been found of interest for the manufacture of printing inks, paper varnishes and wire lacquers. Other new Vinalak solutions to be shown are internally plasticised vinyl acetate copolymers in ethanol, polyethoxyethyl methacrylate in isopropanol, and polystyrene in Octaro. (Stand 67.)

Laboratory Change Drum

Mixers and blenders to be featured by **Winkworth Machinery Ltd.**, 65 High Street, Staines, will be on a laboratory scale. These will include their laboratory change drum (or jar) tumblers, which consist of a geared motor unit mounted on a base with double projection shafts on which are mounted brackets to hold $\frac{1}{2}$ lb. jars. The design of this model is based on the production size of change drum tumbler, which has a wide variety of uses in addition to dry colour mixing.

Also to be shown is a laboratory size of ribbon-bladed powder blender, directly coupled to a geared motor unit mounted on a base. Working capacity is 1-1 $\frac{1}{2}$ lb. and the model is easily dismantled for cleaning. Other twin-bladed laboratory mixers will be shown to various specifications and with easily interchangeable alternative blade arrangements. A twin-bladed mixer will be shown mounted with a variable speed geared motor unit, to give a variation in speed from 20 r.p.m. up to 100 r.p.m.

With the exception of the change drum tumbler, all mixers and blenders on show can be supplied in stainless steel, with or without jacketed troughs for steam heating or water cooling. Vacuum models can be obtained in all cases; and electrically heated troughs may be supplied for high temperature operations. (Stand 38.)

Dimac Fatty Acids

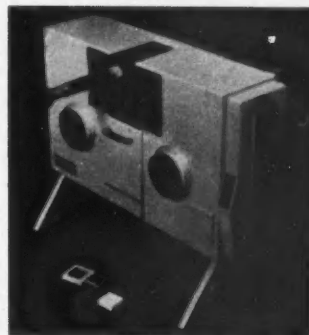
Exhibits by **Victor Wolf Ltd.**, Victoria Works, Croft Street, Clayton, Manchester 11, will feature fatty acids of outstanding colour and heat stability, from which products of pale colour can be manufactured, such as epoxy esters. Samples of their Dimac, the first dimeric acid to be bulk-produced outside the American continent and which is said to be considerably paler in colour than the material hitherto available from that source will also be on show on the stand. Chemical figures of a typical sample of Dimac are: Acid value, 184.0; Sap. value, 194.7; Iodine value (Kaufmann) 94.5; Unsat. matter, 0.7%; Viscosity (25°C), 128 stokes; Colour, 12 PRS; Monomer, 9.7%; Dimer, 77.2%; Trimer, 12.4%.

The company will draw attention to

the products of extremely pale colour that can be produced from Dimac, by showing samples of polyamides made from it. (Stand 30.)

Redesigned Lovibond Schofield Tintometer

A redesigned model of the Lovibond Schofield Tintometer will be demonstrated by **Tintometer Ltd.**, Waterloo Road, Salisbury. This instrument, type



Type 1A Lovibond Schofield Tintometer

1A, incorporates nearly double the illumination of the previous model and thus improves the possibilities of matching highly saturated and dark coloured samples. Readings can readily be converted into the x, y and z values of the international C.I.E. system.

A new 5th edition of 'Colorimetric Chemical Analytical Methods' will be available for inspection. (Stand 28.)

Younghusband, Barnes Promise Surprises

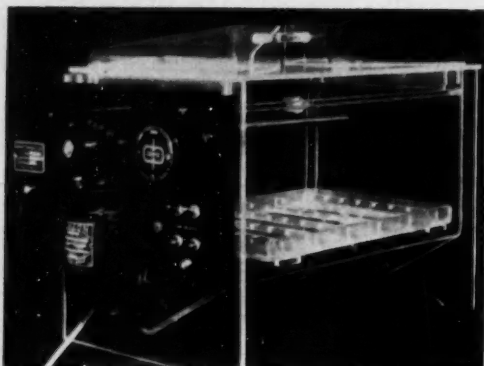
Decision to spring a few surprises at the exhibition is the policy of **Younghusband, Barnes and Co. Ltd.**, Lower King and Queen and Upper Globe Wharves, London SE16. This year's exhibit will include the results of recent research projects which will bring new developments in drying oils and intermediates. It is expected that one, with a special interest for alkyd manufacture, will be at the pilot plant scale by the time of the exhibition. See also Distillates, p. 456. (Stand 68.)

New Polymer Techniques

New polymerisation techniques will be shown by the **Dunlop Co. Ltd.**, Erdington, Birmingham 24. In place of copolymers, graft polymers of two monomers have been developed, using chemicals (radical) initiation, photoimitation and gamma radiation.

The new Polimul 850 series of polyvinyl acetate emulsions has a very fine particle size causing a smooth and more complete film integration. Satisfactory paints may be made at higher pigment binder ratios than with normal p.v.a. emulsions. The Polimul 860 series provides good pH stability and minimises attack on containers. (Stand 44.)

PREVIEW OF O.C.C.A. EXHIBITION



Corrosion cabinet by Research Equipment (London) Ltd. is made from acrylic material. Internal working space is about 16 in. by 10 in. by 7 in.

is felt that these will be of interest to manufacturers of non-drying alkyd resins which are used as plasticisers for urea formaldehyde resins for use in white stoving finishes.

Caproic acid (C_6), caprylic acid (C_8) and capric acid (C_{10}) all of which have a purity of over 90% will be offered. Pilot plant quantities of these three acids are available for examination.

Cyclopentanone, which was first offered for sale in bulk quantities towards the end of 1958 will also be exhibited.

A new plant employing the soda saponification technique for the production of castor fatty acids has been brought into operation since the last exhibition. The range of products from this plant will be of interest to manufacturers of alkyd resins. 12-hydroxystearic acid (hardened castor oil fatty acids), technical ricinoleic acid and tung oil fatty acid will all be exhibited. (Stand 4.)

Device for Minimising Ink Fly

The Printing, Packaging and Allied Trades Research Association, Randalls Road, Leatherhead, Surrey, will show equipment used in the laboratory for studying various aspects of ink behaviour. Of special interest will be a laboratory-scale device for minimising ink fly which operates on the principle of air jets blowing the ink particles back into the nip region.

Another exhibit likely to arouse interest will be a working demonstration of equipment in which transparent rollers are used for observing the behaviour of ink films in the nip. Weissenberg's phenomena of visco-elastic effects with media common to both printing inks and paints will also be demonstrated. (Stand 52.)

Corrosion Cabinets for Use with Sulphur Dioxide

In addition to their standard range Research Equipment (London) Ltd., 64 Wellington Road, Hampton Hill, Middlesex, will exhibit two corrosion cabinets

for use with sulphur dioxide and other gases.

These cabinets are of similar design to those used for salt spray tests, but have thermostatically controlled heaters and circulating fans incorporated in the construction. (Stand 40.)

Developments in Pigment Dispersion

Last year Reeves and Sons Ltd., Lincoln Road, Enfield, Middlesex, introduced their range of pigments dispersed in various media. Work has continued by the pigment laboratory staff to improve and increase the range and application of colours available in this form.

A new range of translucent pigments dispersed in a polyester resin has been made available and will be shown as part of the stand design. These pigments are primarily for use with reinforced plastic roof lights. They show remarkable fastness to light even when used in low concentration.

Work has also been carried out to improve the range of colours available for p.v.c. pastes, especially colours to B.S.S.

Since the last exhibition the company has carried out research into methods of dispersion. Investigations, both in this country and abroad, have been made in an endeavour to obtain the most up-to-date methods and plant which will produce pigment dispersions of the highest possible order. (Stand 27.)

Colour Measurement and Matching

Instrumental colour measurement and some of its applications to industrial colour matching will be illustrated on the stand of the Research Association of British Paint, Colour and Varnish Manufacturers, Waldegrave Road, Teddington, Middlesex. The basis of all such work is that by reason of the trichromatic properties of the eye, any colour can be matched by additive mixture of three primary lights, a fact which will be demonstrated.

The international (C.I.E.) system for colorimetry is based on the average

colour response of the normal eye.

Colour measurements can be carried out by photoelectric means, provided that the response of the instrument to different parts of the spectrum is arranged to match the response curves of the eye. (Stand 54.)

Products for Surface Coatings by Shell Chemical

The theme of the stand of the Shell Chemical Co., 15-17 Great Marlborough Street, London, W.1, will be 'Shell products for the surface coating industry'. The latest developments in the study of solvent systems for applying protective and decorative coatings on metal will be illustrated.

Space will be devoted to a demonstration of results achieved in development work at Shell's Egham technical service laboratories with the Shell range of ketone, alcohol, ether and glycol ether solvents, with special reference to solvent formulations suitable for use with acrylic resins.

Two newer applications for Epikote resins will be featured—Epikote resin-based car primers and Epikote resin/coal tar systems. (Stand 33.)

Sturge Precipitated Calcium Carbonate

Latest grades of Sturge precipitated calcium carbonate which offer the following properties: surface coated or uncoated; low, medium and high oil absorption; ultrafine, fine and medium particle size; and which are supplied in either powder or water paste, will be featured by John and E. Sturge Ltd., Wheeleys Road, Birmingham 15.

Trade names are Calofort, Calopake, Sturcal and Calofil and these grades are used as extenders in the production of printing inks. Some of the Calofort grades are available in water-paste form for the preparation of inks by a flushing process.

In paints, the ultrafine coated Calofort S and T are used to prevent settlement and are said to be effective even in the presence of heavy pigments such as red lead. The same grades can be used to overcome flotation problems.

Calopake F is an effective flattening agent and improves the colour of titanium dioxide. Another Sturge product, citric acid, is used in the production of resins and plasticisers. (Stand 49.)

Union Carbide to Show Products for Fawley

The main products to be produced at the Fawley plant of Union Carbide Ltd., 103 Mount Street, London W.1, when it comes into operation will be featured by this company, including the non-ionic grades of Tergitol surface active agents. These are NP-14, NP-27, NPX, NP-35 and NP-40, which are all polyethylene glycol ethers.

Glycols scheduled production is for

PREVIEW OF O.C.C.A. EXHIBITION

ethylene, diethylene and triethylene glycol and all the polyethylene glycols in the Union Carbide Carbowax range, except methoxy p.e.g. In alkanolamines, the U.K. plant will produce mono-, di- and tri-ethanolamine.

Production of glycol ethers will be of the Cellosolve and Carbitol ranges. The Carbitol solvent is diethylene glycol monoethyl ether; butyl Carbitol is a colourless liquid with a slow evaporation rate and is a solvent for nitrocellulose and many other resins. Methyl Cellosolve, with the most rapid evaporation rate and the lowest boiling point of the range of glycol-ethers, is a medium-boiling solvent for nitrocellulose.

Cellosolve, said to be an excellent solvent for nitrocellulose and alkyd resins, has a mild odour and a low evaporation rate. As a lacquer solvent it contributes gloss and improved flow-out and it will tolerate a dilution of 5 parts to 1 with toluene.

When used in lacquers, the slow evaporation rate of butyl Cellosolve aids bluish resistance and improves gloss and flow-out. An effective viscosity-reducing agent for alkyd baking enamels, it is also finding use in quick-drying varnishes and enamels. When used to the extent of 10% with petroleum hydrocarbons it is an excellent thinner for these varnishes.

Another product not due for production at Fawley, but which will be shown on the stand, is Cellosize hydroxyethyl cellulose. (Stand 1.)

Developments in Polymers by Vinyl Products

An exhibit of decorative emulsion paints by **Vinyl Products Ltd.**, Carshalton, Surrey, will show that water spotting can be substantially overcome by basing emulsion paints on the new vinyl acetate-vinyl stearate copolymers now in their final development stage. Another display will illustrate the importance of low temperature film formation on the performance of pigmented emulsions as sealing coats; it is also to be shown that the drying oil compatibility of the vinyl acetate-vinyl caprate copolymer emulsions makes it possible to formulate sealers of greatly improved binding properties for powdery surfaces.

An acrylic lacquer finishes exhibit will feature the development of a special methacrylate terpolymer for air-drying and forced-drying automotive finishes. The presence of carboxyl groups in the terpolymer improves pigment dispersion and gloss, while copolymerisation with higher alkyl methacrylates confers internal plasticisation; the new terpolymer has good petrol resistance and is compatible with polymethyl methacrylate and nitrocellulose.

For floor maintenance products two new Vinamul emulsions, based on modified methacrylate and styrene copolymers, will be shown for the first time.

New products to be announced include

a fine particle size, yet highly concentrated, polyvinyl acetate emulsion for the formulation of gloss paints; an alkali-soluble internally plasticised terpolymer emulsion for leather finishing; a non-volatile syrup of polyvinyl caprate which is suggested for use in metal casement putties, and an ethanol solution of a vinyl acetate-vinyl benzoate copolymer which has been found of interest for the manufacture of printing inks, paper varnishes and wire lacquers. Other new Vinalak solutions to be shown are internally plasticised vinyl acetate copolymers in ethanol, polyethoxyethyl methacrylate in isopropanol, and polystyrene in Octaro. (Stand 67.)

Laboratory Change Drum

Mixers and blenders to be featured by **Winkworth Machinery Ltd.**, 65 High Street, Staines, will be on a laboratory scale. These will include their laboratory change drum (or jar) tumblers, which consist of a geared motor unit mounted on a base with double projection shafts on which are mounted brackets to hold $\frac{1}{2}$ lb. jars. The design of this model is based on the production size of change drum tumbler, which has a wide variety of uses in addition to dry colour mixing.

Also to be shown is a laboratory size of ribbon-bladed powder blender, directly coupled to a geared motor unit mounted on a base. Working capacity is 1-1 $\frac{1}{2}$ lb. and the model is easily dismantled for cleaning. Other twin-bladed laboratory mixers will be shown to various specifications and with easily interchangeable alternative blade arrangements. A twin-bladed mixer will be shown mounted with a variable speed geared motor unit, to give a variation in speed from 20 r.p.m. up to 100 r.p.m.

With the exception of the change drum tumbler, all mixers and blenders on show can be supplied in stainless steel, with or without jacketed troughs for steam heating or water cooling. Vacuum models can be obtained in all cases; and electrically heated troughs may be supplied for high temperature operations. (Stand 38.)

Dimac Fatty Acids

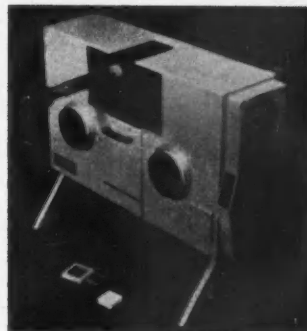
Exhibits by **Victor Wolf Ltd.**, Victoria Works, Croft Street, Clayton, Manchester 11, will feature fatty acids of outstanding colour and heat stability, from which products of pale colour can be manufactured, such as epoxy esters. Samples of their Dimac, the first dimeric acid to be bulk-produced outside the American continent and which is said to be considerably paler in colour than the material hitherto available from that source will also be on show on the stand. Chemical figures of a typical sample of Dimac are: Acid value, 184.0; Sap. value, 194.7; Iodine value (Kaufmann) 94.5; Unsat. matter, 0.7%; Viscosity (25°C), 128 stokes; Colour, 1 $\frac{1}{2}$ PRS; Monomer, 9.7%; Dimer, 77.2%; Trimer, 12.4%.

The company will draw attention to

the products of extremely pale colour that can be produced from Dimac, by showing samples of polyamides made from it. (Stand 30.)

Redesigned Lovibond Schofield Tintometer

A redesigned model of the Lovibond Schofield Tintometer will be demonstrated by **Tintometer Ltd.**, Waterloo Road, Salisbury. This instrument, type



Type 1A Lovibond Schofield Tintometer

1A, incorporates nearly double the illumination of the previous model and thus improves the possibilities of matching highly saturated and dark coloured samples. Readings can readily be converted into the x, y and z values of the international C.I.E. system.

A new 5th edition of 'Colorimetric Chemical Analytical Methods' will be available for inspection. (Stand 28.)

Younghusband, Barnes Promise Surprises

Decision to spring a few surprises at the exhibition is the policy of **Younghusband, Barnes and Co. Ltd.**, Lower King and Queen and Upper Globe Wharves, London SE16. This year's exhibit will include the results of recent research projects which will bring new developments in drying oils and intermediates. It is expected that one, with a special interest for alkyd manufacture, will be at the pilot plant scale by the time of the exhibition. See also Distillates, p. 456. (Stand 68.)

New Polymer Techniques

New polymerisation techniques will be shown by the **Dunlop Co. Ltd.**, Erdington, Birmingham 24. In place of copolymers, graft polymers of two monomers have been developed, using chemicals (radical) initiation, photoimitation and gamma radiation.

The new Polimul 850 series of polyvinyl acetate emulsions has a very fine particle size causing a smooth and more complete film integration. Satisfactory paints may be made at higher pigment binder ratios than with normal p.v.a. emulsions. The Polimul 860 series provides good pH stability and minimises attack on containers. (Stand 44.)



The new research block is right foreground. Behind are the chimneys of Alkali Division works

R.S. President Open I.C.I.'s New Winnington Research Labs.

LARGE-SCALE extensions to one of Britain's most famous industrial research laboratories—that of I.C.I. Alkali Division's research department at Winnington, where research has been carried out since 1873, where Freeth worked on ammonia soda and where polythene was discovered—were opened on 4 March by Sir Cyril Hinshelwood, president of the Royal Society. The extensions, which cover an area of 20,000 sq. ft., will increase the overall laboratory area by about a third.

The ground-floor houses the semi-technical and development stages that usually follow laboratory-scale research in the establishment of new products and processes. The two upper floors which accommodate about 60 graduate scientists and their assistants have been designed to allow some flexibility in their layout, e.g. benches can be resited without interfering with service outlets and can even be replaced with special equipment.

Piped and wired services to the new building include electric power for laboratory equipment and portable tools, hot and cold water, distilled water, gas, steam and compressed air. On the upper two floors, the services run in ducts in the floors and behind wall panels, while on the ground floor they are situated in the ceiling so that they can be led down without obstructing floors and walls.

Research at Winnington dates from 1873 when Brunner, Mond and Co., one of I.C.I.'s founder-firms, began operating their ammonia soda plant there. But not until the arrival of F. A. Freeth from Liverpool University in 1909 did research really expand. Freeth saw that the phase rule theorem—an expression of the relationships between mixtures—was a key to discovering the most economic method of separating and purifying chemical compounds.

During the 1914-18 war, when Britain's armed services were short of explosives, pioneer work into reactions involving

sodium nitrate enabled Brunner, Mond to convert their works for the manufacture of ammonium nitrate in a few months. At the peak of the war, production here and at Government factories was running

Fallacious to Say Pure and Applied Science are Not Inseparable—Sir C. Hinshelwood

TODAY there was an absolutely inseparable relation of pure and applied science and to talk of the two as though they were distinct was completely fallacious and in the minds of the ordinary man was harmful. This was stated by Sir Cyril Hinshelwood when he opened the extension to the Winnington laboratory.

Arising out of that were the admirable relations which had grown up between the industrial world and the academic world which was an element of real importance in our national life.

Sir Cyril spoke of Dr. Freeth's "fundamental optimism". He said that that was a good note with which to start a new research laboratory because optimism was very important in research. He would undertake to prove to anybody that any research they proposed to undertake could not possibly be worth doing and a lot of people did take that line. It was the dominant note in the civil service with results which were apparent to everybody. That optimism must be combined with a very sound practical common sense—"head in the air, feet on the ground." That was the right way round. Sir Cyril did not believe that it was right in research to look for "some kind of pale compromise between the severely practical and the imaginative".

He added: "I think you want to divide your efforts. The research department must give really practical sound common sense service to, the works in general in a way which makes everybody feel that they are earning their keep, but

at 300 tons of ammonium nitrate a day.

When I.C.I. were formed in 1926, Brunner, Mond were able to contribute a research organisation of considerable talent. They had earlier set out to bridge the gap between industrial and academic research by recruiting chemists of sufficient calibre to undertake both background research for the company and to act as knowledgeable and effective consultants over an ever wider range of physico-chemical problems.

In 1928 new research laboratories were opened, which, with later extensions, had an area of some 50,000 sq. ft. Although research at the Alkali Division covered the wide field of alkalis, it was decided to work on other new processes that might give economic returns. This policy led to the discovery of polythene in 1933. Other products produced under a diversified research programme included Winnofil and Fortafil, a series of fillers for natural and factitious rubbers; the preparation of potassium carbonate; and valuable contributions to Government projects including that of atomic weapons.

High-pressure reactions are still being examined at Winnington and the changing circumstances of the alkali industry have stimulated thought on varying the long-established processes and products, so that alkali research continues to be a large part of the laboratory's work.

they also must assert the right to pursue their own imaginative lines at the same time, not in a curious mixture which waters down each of these efforts but as a separate contribution both of which are made, and I believe that that policy was very much favoured and implemented by Freeth himself".

Another important point in research activity was to back "your intuitions" because "you must have a flutter sometimes in research". He had known almost the complete dynasty of research directors during the saga of Winnington. Each had made some major important contribution to the experience of the place. They were all very different from one another, but they each made some characteristic contribution in a way which demonstrated that there was not one way of running research, there was not one method, there was not one technique, one attitude was not necessary. All sorts of different attitudes and temperaments could successfully run research departments provided there was in the background a combination of the scientific knowledge with the humane attitude that was essential in research.

Sir Cyril concluded by saying "the people in the research department realise that you have to do a practical job as well as pursuing imaginative projects. Some degree of freedom is necessary and also a good deal of discipline and recognition of the everyday needs of the moment. Without the combination of these things the future is not very rosy. But in this place I think the omens are extremely good".

Good End Points Claimed for New B.D.H. Solution

NEW addition to the range of solutions for analytical use prepared by British Drug Houses Ltd. (B.D.H. Laboratory Chemicals Division, Poole, Dorset) is tetra-*n*-butyl ammonium hydroxide N/10 in benzene/methanol. This reagent has been recommended as possessing marked advantages over alkali metal ethoxides and methoxides in the titration of acidic substances in non-aqueous media (*Anal. Chem.*, 1956, **28**, 787, 792). It can be used with the glass electrode without the loss in sensitivity in the highly alkaline region encountered with titrants containing sodium and potassium and with a suitable glass-calomel electrode system, in amine-type or neutral solvents, for the determination of a variety of acidic substances and mixtures of very weak, weak and strong acids. Good endpoints are claimed, together with freedom from interfering precipitates.

In addition to this specially prepared solution, tetra-*n*-butyl ammonium hydroxide can now be supplied in 40% w/w solutions for general laboratory investigations.

Suggested as a superior substitute for potassium hydroxide or sodium hydroxide used in the Zimmerman test for 17-ketosteroids is *N*-benzyl-trimethyl ammonium methoxide 40% w/w solution in methanol. Claims made for this reagent are that not only are more reliable and reproducible results obtained, but that it eliminates the necessity for extensive purification of the other reagents used.

2-Deoxy-D-Glucose

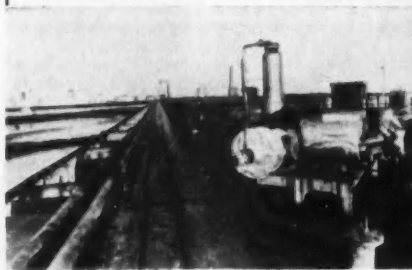
Likely to be increasingly used in the study of various aspects of carbohydrate metabolism is 2-deoxy-D-glucose. This structure analogue of D-glucose has been shown to inhibit fermentation of glucose by intact yeast cells, to inhibit glycolysis of glucose in a variety of normal and tumour tissues, and to have definite antitumour activity in rats. The substance has been shown to be converted into 2-deoxy-glucose-6-phosphate, which inhibits competitively the conversion of glucose-6-phosphate into fructose-6-phosphate by the enzyme phosphoglucose isomerase. In addition it is responsive to insulin in certain experimental conditions.

Another new entry to the B.D.H. catalogue is *p*-chloro-benzaldehyde, an intermediate of general interest, and methanethiol (methyl mercaptan) has been restored to the list and is available in 25 ml., 100 ml. and 250 ml. ampoules.

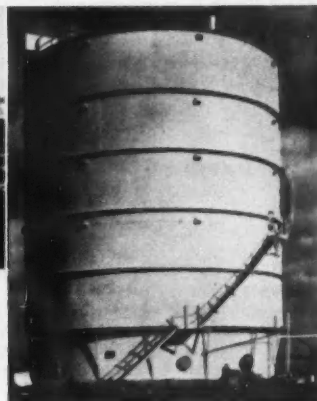
For the latex fixation test in rheumatoid arthritis, B.D.H. have arranged with Styrene Products Ltd. an associate of Shell Chemical Co. Ltd., to undertake the distribution in laboratory quantities (100 ml. and 500 ml.) of polystyrene latex of their manufacture for use in this test, which has been described by G. Burby and C. Behr in *The Lancet*, 1958, *ii* (29)

(Continued at foot of next column)

A.P.V. & Ashmore, Benson, Pease Plant for Methane Project



Left, insulated aluminium pipeline supplied by A.P.V. Right, the 100,000 cu. ft. Wiggins dry seal gasholder, supplied by Ashmore, Benson, Pease and Co., one of the Power-Gas Group, Stockton-on-Tees



THE 2,000 ft. insulated aluminium pipeline, 10 in. diameter shown above, conveys liquid methane from ship to storage tanks on the North Thames Gas Board site at Canvey Island, which was chosen for the Gas Council's trial project for methane imports.

The pipeline with one of the two 90,000 cu. ft. storage tanks was constructed by the A.P.V. Co. Ltd., Crawley, Sussex, who pioneered aluminium welding in the U.K. 50 years ago. The project probably includes the largest amount of fully radiographed welding ever executed on site in this country.

The tanks store liquid methane at -260°F . A cut-away model of the other storage tank, made by Whessoe Ltd., Darlington, was shown in *CHEMICAL AGE*, 28 February, p. 351.

B.C.L. Form Plastic Films Division

BRITISH CELLOPHANE LTD. have formed a plastic films division for the manufacture and marketing of films other than Cellophane cellulose film.

The plastic films division is at present responsible for the production and marketing of B.C.L. polythene film, which the company has been making for a number of years. It is also developing 'Lubrithe', a multi-ply thermoplastic material used as a separating membrane in concrete-laying introduced in 1958.

In addition, the division is marketing three other films for which British Cellophane Ltd. have been appointed selling agents. These are Dupont's 'Mylar' (polyester) film, the unplasticised p.v.c. film manufactured by La Cellophane S.A. of France, and the bi-axially orientated polystyrene film made by B.X. Plastics Ltd.

November), 1157. The detector system used is a suspension of polystyrene latex particles coated with human γ -globulin. These particles are agglutinated by sera of patients suffering from rheumatoid arthritis after incubation at a temperature of 56°C for 1 to 2 hours in dilutions of 1 in 20 or more.

On the right, above, is a 100,000 cu. ft. Wiggins dry seal gasholder completed by Ashmore, Benson, Pease and Co., a member of the Power-Gas Group, for the methane site on Canvey Island. The holder will store the gaseous bleed-off from the two liquid methane storage tanks, an application for which its ability to operate at sub-zero temperatures makes it particularly suitable.

The Wiggins dry seal holder is now used in many sections of the chemical industry for the storage of dry gases as well as various corrosive gases that are difficult to contain in water-sealed holders. Even SO_2 , one of the most difficult gases to contain, can be successfully stored by this holder. Since 1950, the company has received orders for nearly 70 Wiggins dry seal gasholders.

Cyanamid Announce Synthesis of Tetracycline

THE first total synthesis of a tetracycline, biologically active and related to aureomycin, was announced by American Cyanamid U.S. (See *CHEMICAL AGE* last week p. 409.)

Making the announcement, Dr. Robert C. Swain, vice-president for research and development, said it was "an important scientific breakthrough which could lead to the construction of new antibiotics, all of which heretofore have been derived from living organisms."

Dr. Swain also announced completion of plans for a laboratory in Geneva devoted to long-range research in the chemical and biological sciences. It will be known as the Cyanamid European Research Institute Inc.

British, Swiss, French, German and other European scientists will be employed at the centre, which Dr. Swain said would not be an industrial laboratory.

Cyanamid are already spending \$25 million dollars a year on research. More than 50% of current sales come from products developed in the company's laboratories which were unknown 10 years ago.

Chemist's Bookshelf

SCOPE OF PHYSICAL CHEMISTRY

ANNUAL REVIEW OF PHYSICAL CHEMISTRY. Edited by H. Eyring. Annual Reviews, Inc., California. 1958. Pp. viii + 511. \$7.

As new developments in physics lead to new approaches to chemical problems the scope of physical chemistry widens. Annual reviews of the subject are therefore valuable not only in providing the specialist with a critical survey of his field but also in suggesting new techniques and approaches to workers in other fields. The current volume contains 21 chapters, each being a survey of recent work in a particular field by an acknowledged expert and including an extensive bibliography covering, in some cases, work up to December 1957.

A first review on Thermochemistry and Thermodynamic Properties of Substances (M. A. Paul), reviews developments in apparatus and technique, gives thermodynamic data and tabulates substances and properties studied. A chapter on Cryogenics (H. A. Fairbank, M. J. Buckingham and W. H. Fairbank) is mainly concerned with aspects of superconductivity and studies of the forms of liquid helium. A review of Solutions of Electrolytes (T. Shedlovsky), deals with recent theoretical studies of interionic attraction and includes a section on recent Russian contributions. A chapter on Solutions of Non-Electrolytes (J. S. Rowlinson) is mainly concerned with recent work on fundamental principles and mixtures of different types.

Developments in Physics

The importance of recent developments in physics is shown by a review of The Solid State (L. Guttman) which considers a number of recent studies of general crystal theory, magnetism, electronic structure and properties of crystals. A chapter on Nuclear and Electron Spin Resonance (J. E. Wertz) includes a number of theoretical aspects and some electron spin resonance studies of metals, free radicals and defects in solids. The growing volume of work in the field of Radiation Chemistry is reflected in a review (M. Lefort) dealing with gases, inorganic and organic substances (including polymers), hot atom chemistry, dosimetry and irradiation facilities. A review of Ion Exchange Resins and Membranes (W. J. Argersinger) considers new work on mineral exchangers, resins, the theory of ion exchange and membranes. In a review of Mechanical Properties of High Polymers (H. Leaderman) the present state of knowledge of properties such as viscosity, viscoelasticity and birefringence is outlined.

Two reviews are concerned with reaction kinetics. The first (D. Garvin) deals with rate theory and reactions in gases. The other, Kinetics in Solution (A. Fava), is restricted to mathematical treatment of data, medium and isotope effects and reactions. Some problems related to in-

dustrial catalysts and catalytic reactions are considered in a review of Surface Chemistry and Contact Catalysis (A. G. Oblad and A. Farkas). Topics discussed under Physical Organic Chemistry (R. W. Taft, N. C. Deno and P. S. Skell) include effects of structure on reactivity, aromatic substitution, acidity functions and methylenes.

A group of Japanese authors review recent developments in Quantum Theory of Electronic Structure of Molecules. A chapter on Molecular Electronic Spectra (G. Herzberg) is mainly concerned with simple molecules and results of fine structure investigations. A short review of Spectroscopy (M. K. Wilson and V. A. Crawford) deals with rotation and vibration spectra and includes a summary of information obtained from micro-wave spectra. Under Experimental Molecular Structure (D. P. Stevenson and J. A. Ibers) the reviewers include recent progress in electron diffraction techniques and limitations of certain methods used in nuclear magnetic resonance studies. Recent work from both equilibrium and

non-equilibrium aspects is considered in a review of Statistical Mechanics (C. F. Curtiss).

Chemical reactions at high pressures continue to arouse interest and the review of High Pressure Developments (H. T. Hill and S. S. Kistler) is timely. It is mainly concerned with apparatus and techniques and physical phenomena observed at high pressures. The production of synthetic diamonds is mentioned. There is a very clear and concise review of Optical Rotatory Power (W. Kuhn) in which theory is discussed and some uses and applications described. A review of Colloid and Surface Chemistry (A. C. Zettlemoyer) considers the production and stability of colloid systems, particularly those of lyophobic type, interfaces, some properties of colloidal systems, surface-active agents and biological colloids.

The reviews are, in general, well balanced. Author and subject indices are good. Physical chemists will find much useful information in their own or related fields and stimuli from reviews of other topics. Such reviews as those on ion-exchange, surface chemistry and contact catalysis and high pressure developments may also provide information of value to the works or manufacturing chemist. The publishers are a non-profit making organisation and the price, for a book of this type, is very reasonable.

W. R. MOORE.

Catalytic Gas Reactions

SOME CATALYTIC GAS REACTIONS OF INDUSTRIAL IMPORTANCE. By J. C. Ghosh, S. K. Bhattacharyya and M. V. C. Sastri. Oriental Institute, Baroda. 1958. Pp. 335. Rs. 13:50 nP.

This book is concerned with the catalytic synthesis of ammonia, urea, methanol, higher alcohols and oil and is compiled from an expansion of a series of lectures given at Baroda University, India.

A thorough review of adsorption and heterogeneous catalysis covering the period up to 1945 is contained in the first chapter. Particular emphasis is given to surface chemical studies as a powerful means of understanding the nature of contact catalytic reactions. These studies include the determinations of surface area by the B.E.T. method, the distribution of promoters at the catalyst surface as found by low-temperature chemisorption, the degree of heterogeneity of the surface estimated by the Taylor-Liang method and the study of simultaneous adsorption of reactant gases from mixtures. There is some limitation, however, due to the lack of reference to the fluidised catalyst process.

Ensuing chapters describe in turn the synthesis of the five above materials in very great detail. The chapter on the catalytic synthesis of ammonia may be taken as an example. In it the authors give a brief history of the process and discuss the thermodynamics of the synthesis. Considerable information is given on the catalysts used and their performance in commercial practice. The development of the Tempkin-Pyzher theoretical equation, representing the

data on the synthesis and decomposition of ammonia, is outlined. The section of the chapter dealing with the industrial process gives details of the production condition of hydrogen and nitrogen and of their purification. Finally the six major ammonia synthesis processes in use are reviewed critically and a full description of two Indian fertiliser plants is given as an appendix.

The chapter on the synthesis of oil from coal by the Fischer-Tropsch processes follows the same pattern as that on ammonia but gives much greater detail of the development of the catalyst, chemical studies on the catalyst and mechanism of the synthesis. Processes for the production of synthesis gas by coal gasification are described and include the Lurgi pressure gasification process using oxygen. The various modifications to the F.T. process are given together with analyses of the products and some attempt is made to compare the modifications. The chapter is completed by a brief description of the isobutene synthesis and Oxo processes. A separate chapter describes the Bergius high pressure hydrogenation of coal to produce oils and also gives details of the hydrogenation of tar and tar oils.

In every chapter there is a survey of current world interest in the processes. Descriptions of plants and flow sheets are also included, and full reference is made to the relevant literature.

No student of catalytic chemistry should be without this book and it should be of use to any chemist engaged in this field.

G. A. VAUGHAN.

Authors Discuss Procedures for Laboratory Distillation

LABORATORY DISTILLATION PRACTICE. By E. A. Coulson and E. F. G. Herrington. George Newnes Ltd., London. 1958. Pp. 166. 25s.

Where only small quantities of pure material are required or only relatively small amounts of material are available for fractionation, vapour phase chromatography preparative columns have to a large extent taken the place of conventional fractional distillation columns. Nevertheless fractional distillation must still be used where large quantities of material have to be fractionated or vapour phase chromatography apparatus is not available, and thus this book comes as a very welcome addition to the literature on this topic.

The authors have attempted with some success to examine the reasons for the use of the different distillation procedures available. It is particularly pleasing to note the alliance brought about between theory and practice; discretion over too rigid an application of the theory, however, is emphasised.

On the practical side the book is well illustrated with lucid diagrams and detailed descriptions, and although one may prefer apparatus which does not follow the author's designs it is not possible to find fault in these designs except in one or two minor points. Operating procedures for the different types of apparatus described, which ranges from fractional distillation columns to be used below -60°C and molecular stills, to continuous fractionation columns and extractive distillation columns, are clearly set out.

Theoretical aspects of the book have been kept to a minimum; where possible diagrams have been used to illustrate various points. Operating characteristics of columns are discussed theoretically, and methods of measurement are given together with nomographic means of quickly finding approximate answers to Fenske's equation.

It is clear that much thought and work has gone into this book and it is felt that it will provide a means of clearing away much of the fog that still surrounds laboratory distillation practice.

R. HARDY.

New Work on Strengths of Chemical Bonds

THE STRENGTHS OF CHEMICAL BONDS. By T. L. Cottrell. Butterworths, London. 1958. Pp. x + 317.

At the time the first edition of this book appeared, the longstanding controversy regarding the true values of $D(\text{CO})$ and $D(\text{N}_2)$ remained unresolved. Equally plausible arguments could be adduced in favour of either the 'high' or the 'low' values. There were even some protagonists of 'middle' values. It is no reflection on the author's judgment that he guessed wrongly and adopted the 'low' values; he was just out of luck. Indeed,

he was doubly unlucky, for a short time after his book was published the controversy was definitely settled in favour of the 'high' values. This meant that all the thermochemical quantities (and there were many such) which he derived on the basis of his wrong guess needed revision. This important task he has accomplished in the present edition, which is therefore most welcome, as it saves all of us the trouble of having to do the job ourselves. He has, in addition, taken the opportunity to include all the important new work; thus most of the relevant information published up to the end of 1957 will be found here.

In the space available the author succeeds admirably in giving explicit critical consideration to practically all the work of key importance; the value of the book is thereby greatly enhanced. As in the first edition, there is included at the end

Chemist's Bookshelf

a comprehensive table of accepted values for all the bond strength quantities and bond length data in addition. The bond length data might well, however, have been left out in view of Special Publication No. 11, of the Chemical Society (Tables of Interatomic Distances and Configuration in Molecules and Ions, Ed. L. E. Sutton). Admittedly this work had not appeared when the present second edition went to press, but it was generally known to be impending. This is not to imply that Cottrell's bond length data are untrustworthy in any instance; so far as the reviewer can ascertain they are not. Nevertheless, those seeking bond length data will naturally turn to what must be considered the source of ultimate reliability, just as they will turn in the first instance, to the present work when seeking bond-strength data.

HENRY MACKLE.

Trends in Catalysis

ADVANCES IN CATALYSIS, VOL. X. Edited by D. D. Eley, W. G. Frankenburg and V. I. Komarewsky. Academic Press Inc., New York and London. 1958. Pp. xvi + 326. \$11.00 or £3 7s 6d (approximately).

Fitting tributes are paid to two of the editors, Frankenburg and Komarewsky, who died before the volume was published. Both had played a prominent part in founding "Advances in Catalysis," and had served as editors since the series began in 1948.

Only 7 contributions are contained in this volume but the selection of topics and authors has been excellent. Topics covered range from biological catalysis of the cholinesterases to the industrial processes used in the alkylation of

paraffins and aromatics. All the chapters make interesting and stimulating reading.

R. P. Eischens and W. A. Phiskin give a timely review of the infra-red spectra of adsorbed molecules. This technique has been attracting increasing attention in recent years as a means of finding out more about the physical and chemical nature of adsorbed molecules. The second chapter by A. T. Gwathmey and R. E. Cunningham describes some of the recent work by the first author and his colleagues on the catalytic activity of different crystal faces. They have been using single crystals of various metals as catalysts and examining the activity of individual faces and the changes which occur in the nature of the metal

NATURALLY OCCURRING QUINONES

By R. H. THOMSON, D.Sc., Ph.D., F.R.I.C.

University of Aberdeen

This book presents, for the first time, a comprehensive account of the quinone pigments which form the largest group of natural colouring matters. In structure they vary from the simplest benzoquinones to the complex aphid pigments, and include such interesting and diverse substances as cochineal, hypericin and vitamin K.

The quinones are considered mainly from a chemical stand-point with emphasis on their actions and constitution, and with biologists in mind, the data in natural sources has been carefully compiled. The literature is completely covered up to the end of 1956, and there are many references to papers published in 1957.

Price 50s.

... well written, we recommend it most strongly. JOURNAL OF THE OIL AND COLOUR CHEMISTS ASSOCIATION ... no publication of similar scope has previously appeared. JOURNAL OF THE ROYAL INSTITUTE OF CHEMISTRY ... the first comprehensive account, well-written ... a good book. CHEMISTRY AND INDUSTRY ... so pleasant to read that it will not spend much time on the shelf. HORTICULTURAL ABSTRACTS.

Butterworths Scientific Publications

88 Kingsway, London, W.C.2

Chemist's Bookshelf

surface under different conditions. This is a difficult line of research but one of fundamental importance.

The inclusion of a chapter by the well-known Russian chemist A. A. Balandin is a welcome feature of the book. This deals with the nature of active centres and with the kinetics of various types of catalytic dehydrogenation. In places this chapter is not easy to follow, probably because Professor Balandin's approach to the subject is rather different from the usual. It is well worth studying, however, because he succeeds in correlating a substantial number of results, and his "volcano-shaped curves" for assessing the efficiency of a catalyst for a given reaction are a most interesting concept. F. Bergmann's chapter on the structure of cholinesterases and on the mechanism of their catalytic action in ester hydrolysis is well written. Even if one's interests lie primarily in the field of physico-chemical catalyst, it is fascinating to read an account like this which sets out so clearly some of the difficulties encountered by workers in the field of bio-catalysis.

Commercial alkylation of paraffins and

aromatics by E. K. Jones is the next topic. The account is comprehensive but slightly marred in places by repetition. E. R. S. Winter deals with the reactivity of oxide surfaces. This is a field which he is well qualified to review because of the valuable work that he has done on the exchange of oxygen with oxide surfaces. The final chapter is by G. C. A. Schuit and L. L. van Reijen on the structure and activity of metal-on-silica catalysts and gives an account of a number of investigations designed to compare the properties and catalytic activity of "bulk" metal catalysts with evaporated film catalysts. They also describe an approximate method of making theoretical calculations of the absolute rate of catalytic reactions which they have found to be successful in a number of examples.

The volume is well produced and the illustrations are good. It includes an author index and a subject index. There is no doubt whatsoever that this volume maintains the high standard that we have come to expect of the series and it can be strongly recommended.

C. KEMBALL.

METHODS FOR NITROGEN IN STEEL

THE DETERMINATION OF NITROGEN IN STEEL: Iron and Steel Special Report No. 62. Pp. 146. 37s 6d (25s to members of I.S.I.).

This book which is one of the important Special Report Series of the Iron and Steel Institute, describes in great detail the large amount of work carried out by the Nitrogen Group of the B.I.S.R.A. Gases and Non-Metallics Sub-Committee. The group was formed in 1949 to re-examine the whole subject of the determination of nitrogen in steel.

The report is divided into two main divisions, viz: Parts 1 and 2. Part 1 deals with chemical methods of analysis which involve the solution of the sample, separation of the ammonium ion and its subsequent estimation either colorimetrically or volumetrically. Altogether 14 different methods have been examined using a series of steels each containing one preponderating alloying element. This work has shown that once a steel sample has been decomposed without loss of ammonia, a considerable number of satisfactory methods exist for ammonium determination. Careful experimentation using different acid solvents, X-ray examinations, etc., has enabled a classification to be made of alloying elements which can or cannot lead to the formation of acid-resistant nitrides. The study has enabled a recommended standard chemical method to be drawn up for the determination of nitrogen in steel and also the tolerance limits to be expected when comparing nitrogen determinations conducted on the same sample by different laboratories and within one laboratory.

Part 2 deals with the vacuum fusion method for the determination of nitrogen in steel. Six different laboratories co-operated using the alloy steel samples

examined in Part 1. Part 2, like Part 1 is logically presented in sections but it is shorter in length. Unlike the chemical procedure, it has been impracticable to recommend a specific vacuum fusion method but several useful general conclusions have been drawn. Thus certain nitrides, e.g. titanium nitride, are difficult to decompose and the rapid and complete evolution of nitrogen from steels containing such nitrides does not always take place at fusion temperature below 1,700 to 1,750°C. It has been possible to examine the vacuum fusion data statistically and to assess tolerance limits to be expected when comparing replicate nitrogen determinations made between laboratories and within one laboratory. A most interesting comparison is given between the chemical and vacuum fusion procedures and it is shown, contrary to a body of opinion, that there is in general, excellent agreement between the two types of determination.

On completion of the above work, the Nitrogen Group investigated the determination of nitrogen in ferro-chromium and found that the normal chemical methods are applicable. This work is described in an addendum.

The members of the Nitrogen Group are to be congratulated in the painstaking work which they have performed over a period of many years. The thoroughness of their investigation and the presentation of the data clearly show the strengths and weaknesses of the analytical techniques studied and moreover reveal the difficulties associated with certain types of samples, such as specially processed silicon steels. The report is an essential addition to the library of any laboratory concerned with steel analysis.

C. E. A. SHANAHAN.

Testing Petroleum Products to A.S.T.M.

METHODS OF ANALYSIS FOR PETROCHEMICALS. Edited by E. R. Littman. The Chemical Publishing Co. Inc., New York. 1958. Pp. 384. \$12.

There has been a remarkable expansion in the petrochemical industry since the war and at the present moment the production of chemicals from petroleum in the U.S. amounts to nearly 12 million tons, representing about half of the chemical production in that country. In the U.K. and Western Europe a similar expansion has taken place and about 40% of the organic chemicals are based on petroleum. With such a rapid growth the introduction of standard methods of analysis both as a guide to the purchaser and as control methods by the manufacturer have lagged behind and it is obvious that each company producing chemicals from petroleum sources must have developed methods of analysis of its own. The present book by Dr. Littman has attempted to collect in one volume methods which have been accepted for testing petroleum products by the American Society for Testing Materials and special methods which have been developed in the laboratories of Enjay Co. Inc.

Some 61 methods are given which include such standard determinations as the distillation of petroleum fuels, specific gravity, viscosity, colour and sulphur content by standard A.S.T.M. methods and determination of olefins and diolefins and similar tests by processes developed in the Enjay laboratories. Wherever the A.S.T.M. method is given the equivalent I.P. number is quoted so that users in this country will find reference to British work on the testing of petroleum products.

Each Test Has Been Carefully Scrutinised

Dr. Littman's presentation makes clear the fact that each test has been submitted to careful scrutiny in his own laboratory and therefore can be accepted as applicable within the limits of accuracy quoted. It is, however, surprising that with the exception of the determination of isobutylene by infra-red spectrometry there are no spectroscopic or chromatographic techniques described. In this country very remarkable advances have been made in gas liquid chromatography and it is certain that a very large number of the analyses carried out in the laboratories of the companies manufacturing chemicals from petroleum are now performed by this method. The publication of standard methods of analysis using chromatographic techniques would now be welcomed. With this exception the book by Dr. Littman may be recommended to all laboratories as a standard work of very considerable value.

FRANK MORTON.

Applied Statistics for Chemical Engineers

APPLIED STATISTICS FOR ENGINEERS. By William Volk. McGraw-Hill Series in Chemical Engineering, McGraw-Hill Book Co., Inc. London. 1958. Pp. xi + 354. \$74.

THE range of the McGraw-Hill series of texts on chemical engineering has now been further widened by the inclusion of a volume on statistical methods, the author of which will already be known to chemical engineers. He has set out with the intention of describing statistical techniques rather than statistical theory, so that a reader may apply the appropriate technique to suit his problem without having to study theoretical statistics first. To this end, each chapter deals with a specific method and tries to be as self-contained as possible, and a number of introductory chapters are included to give an idea of some of the basic statistical concepts that will be needed.

Sketchy Introductions are Inadequate

This approach would be acceptable were these introductory chapters adequate, for it is, of course, impossible to use statistical techniques soundly without having a certain minimum knowledge of elementary statistics and probability, but this knowledge is scarcely given by the early chapters of the book. It opens with a very sketchy introduction to 'Probability' and to 'Permutations' and 'Combinations,' which is quite inadequate, and there follow chapters on 'Distributions' and on 'Measures of Variability,' in that order; here, the logic of statistics requires that the order of these two chapters should be reversed, since a study of distributions requires a knowledge of measures of variability. The author then comes to the main part of his work, and discusses successively 'Chi-squared,' 'The t-test,' 'Analysis of Variance,' 'Correlation'—'Regression,' 'Sequential Analysis,' and 'Non-Parametric Statistics,' finishing with a number of tables.

The author suggests that before studying a particular technique the reader should first study chapter 4—on measures of variability. The implication, that the reader has not the necessary knowledge of elementary statistics is serious, for it means that by following this system he will learn to use the techniques rather as a parrot learns to talk.

For those who have this knowledge, however, the book can be a useful addition to the bookshelf, although one feels that its price is distinctly high; for others, there are many far better books from which to learn to use statistical methods.

M. H. KREFS.

FLUID SYSTEMS

CHEMICAL ENGINEERING PRACTICE, Vol. 5, Fluid Systems I. Butterworths Scientific Publications. Pp. 695. 95s.

This fifth volume of Chemical Engineering Practice covers a wider field than might be inferred from its title.

There are twelve sections written by a number of authors many of whom are experts in their own field. The first two sections deal with the transportation of fluids. This covers the necessary aspects that a chemical engineer requires to know from the viewpoint of selecting the right equipment to use for a particular process; rather than the design of pumps, fans, blowers and compressors.

In the following two sections pipe systems for liquids and gases, and the design of high pressure vessels are described. The latter section is dealt with in surprising detail for a volume entitled "Fluid Systems", and comprises the largest single section.

The production of vacuum is discussed in section 5. As in the case of transportation units, the object is to aid the chemical engineer in the choice of equipment rather than its design.

Liquid-liquid equilibria and liquid-liquid stagewise contact systems are treated in the following two sections. Logically, these sections are followed by a brief section on extraction equipment.

The remainder of the volume is devoted to various aspects of distillation, comprising sections on vapour-liquid equilibria, the rectification of binary mixtures, multicomponent distillation and distillation equipment.

Most sections, though not all, have extensive references appended at the end of their separate texts. The work is well written and well illustrated. It should prove a valuable work of reference to all chemical engineers, although its price is more likely to put it on the library shelf rather than in a personal book collection.

E. J. CHARLES.

Volume 6

CHEMICAL ENGINEERING PRACTICE, Vol. 6, Fluid Systems II. Butterworths Scientific Publications. Pp. 600. 95s.

This particular volume of the series is an extension of volume five in that it deals with fluid systems. The subject matter is contained in fifteen sub-sections written by a number of authors and is conveniently grouped into liquid-gas systems, fluidisation and fluidised beds, multicomponent gas systems, liquid-solid systems, and finally a section covering sublimation and vacuum freeze drying.

Gas absorption is discussed in section one, and deals with the theory of absorption both with and without chemical reaction taking place. This is followed by a section dealing with the operating characteristics of packed columns, which are frequently employed in carrying out gas-liquid absorption operations. The next section deals with evaporation practice and includes a description of various

types of equipment as well as general design considerations and calculations.

A small section on the fluidised state, dealing with the dynamics, heat and mass transfer characteristics of such systems is then followed by a discussion of the applications of fluidisation techniques in practice.

Multicomponent gas systems forms the topic of the next three sections, namely the liquefaction and fractionation of gases, adsorption, and refrigeration practice. These three sections are dealt with largely from a descriptive angle although some simple calculations are included. Freeze drying is briefly dealt with under refrigeration as well as in the last section of the book.

The portion of the book dealing with liquid-solid systems is listed in the table of contents as liquid-liquid systems. Separate sections are devoted to leaching, crystallisation, colloids, filtration theory, filtration practice including the selection, sizing and operation of filters, and centrifuging. Here again, to a large extent these sections are mainly descriptive.

This latest volume of the series is well written and well illustrated with graphs and diagrams of equipment, etc. Each section gives extensive lists of references so that the original literature can be consulted. Its value might in parts be enhanced by the inclusion of more practical examples of the solution of problems. It is easy to realise, however, that there must be some limitation on the ultimate length of treatises of this nature. Small sections on vapour phase chromatography and liquid-liquid thermal diffusion could have appeared in either volume 5 or volume 6. In fact these may be discussed elsewhere. These minor constructive criticisms in no way affect the view of this reviewer that here again is another outstanding work of reference for chemical engineers at all levels.

E. J. CHARLES.

Corday-Morgan Medal for 1958

The Corday-Morgan medal and prize for 1958, consisting of a silver medal and a prize of 200 guineas made annually to the chemist who, in the judgment of the council of the Chemical Society, has published during the year in question the most meritorious contribution to experimental chemistry, and who at the date of publication had not reached 36 years of age, is now open. Applications or recommendations for 1958 must be received not later than 31 December, 1959, by the society at Burlington House, London W.1.

Bradford Course on Lubricants

A course on 'Lubricants and lubrication' will be held at Bradford Institute of Technology on Thursday evenings from 9 April to 14 May. The fee is £2 5s. Details may be obtained from the Registrar of the institute.

● As stated in 'People in the News', 28 February, Mr. R. C. CHIRNSIDE, chief chemist of the G.E.C. research laboratories, is the new president of the Society for Analytical Chemistry. Other officers elected at the annual meeting last week were: Past-presidents serving on council: Dr. J. H. HAMENCE, Dr. D. W. KENT-JONES, Dr. J. R. NICHOLLS and Dr. K. A. WILLIAMS; vice-presidents, Dr. D. C. GARRATT (Boots Pure Drug Co.); Dr. MAGNUS PYKE (Distillers Co. Ltd.); Mr. J. G. SHERRATT (Public Analyst, Warrington); hon. treasurer, Dr. A. J. AMOS (Drs. D. W. Kent-Jones and A. J. Amos); hon. secretary, Dr. R. E. STUCKEY (British Drug Houses Ltd.); hon. assistant secretaries: Mr. L. BREALEY (Boots Pure Drug) and Mr. S. A. PRICE (Vitamins Ltd.). Council members: N. L. ALLPORT, H. E. BROOKES, C. H. R. GENTRY, R. F. MILTON, F. C. J. PULTON and C. WHALLEY.

● Mr. A. N. HARROW, F.R.I.C., new chairman of the Scottish section, Society for Analytical Chemistry, is an associate of Heriot-Watt College, Edinburgh, in applied chemistry. He entered the service of Bilsand Brothers Ltd., 75 Hyde Park Street, Glasgow C.3, as their first works chemist in 1955, remaining in control of their laboratory, which has expanded and now functions with qualified staff. Mr.



A. N. Harrow

Harrow has taken part in many of the foreign summer tours of the Food Group, Society of Chemical Industry, and in 1952 visited the U.S. to study developments in the baking industry. He has been a member of the council of the British Baking Industry Research Association for three years.

● Mr. JOHN A. PRESS, works manager at the Aycliffe, Co. Durham, factory of Bakelite, Ltd., is to retire after 40 years in the plastic industry. Mr. Press became works manager at Aycliffe in 1946.

● Mr. H. S. HIBBINS, vice-chairman of Boots Pure Drug Co. Ltd., is one of four senior officials retiring on 31 March. The others are Mr. S. HARKER-SMITH, director of merchandising, Mr. J. W. SEEKINGS, manager of the wholesale and international divisions and a member of the company's executive committee, and Mr. A. H. CRAGG, manager of the printing department. Mr. Hibbins has been a vice-



H. S. Hibbins

chairman of the company since April 1955 and director of production since

PEOPLE in the news

April 1954. He joined the board in 1946. Mr. Hibbins, who joined the company in 1918 on his discharge from the army, qualified as a chemist and druggist in 1919 and as a pharmaceutical chemist in 1921. He played a large part in the formulation of many of Boots manufactured lines and in 1929 he was chosen as secretary of the works planning committee which planned the major development of the Beeston site which now contains the firm's largest factories. After the second world war he became chairman of the committee and he has been closely associated with all recent major developments on the manufacturing side.



Dr. W. P. Grove (left) director of the reorganised Radiochemical Centre of the U.K./A.E.A. (see p. 455). Right is J. Schwartz, manager of the new plastic films division of British Cellophane Ltd. (p. 469)



● Mr. JOHN CLIFFORD DUCKWORTH, B.A., F.Inst.P., A.M.I.E.E., F.Inst.F., will become managing director of the National Research Development Corporation on 1 April. Mr. Duckworth, who is 42, took 1st class honours in physics at Oxford in 1938 and played a leading part in radar research and development during the war. After the war he was engaged in fundamental nuclear physics research at Chalk River in Canada and at Harwell, and was later in charge at Ferranti Ltd. of development and design of the guidance and control system of the guided weapon now known as Bloodhound. In 1954 he joined the then British Electricity Authority with responsibility for the design, construction and operation of nuclear power stations, and he is at present chief research and development officer of the

Central Electricity Generating Board. Mr. DENNIS HENNESSEY has been appointed by the corporation to a new post of deputy managing director. A former principal patents officer at the Ministry of Supply, he joined the corporation's staff in 1950 at the age of 38.

● Mr. WILLIAM JOHNSTON, formerly with Imperial Chemical Industries Ltd., has been appointed a director of Trans-Chemicals Ltd., a member of the Commercial Plastics group of companies, whose office will be at 75 Grosvenor Street, London, W.1. (Hyde Park 9261). The principal function of Trans-Chemicals Ltd. will be the buying of the major raw materials of the group, and buying on behalf of Paz Chemicals Ltd. (formerly Shell Chemical Distributing Co. (Middle East) Ltd.).



W. Johnston

● The Society Medal, S.C.I., has been awarded to Dr. FRANCIS H. CARR, C.B.E., of Petersfield, Hants. The medal is awarded not more than once every two years for Conspicuous Services to Applied Chemistry or to the Society. Dr. Carr, a past president of the society and a former director of Boots Pure Drug Co. and of British Drug Houses, is known for his work on Vitamin D.

● Mr. W. E. HUGGETT, general manager of the Carrington Works of Petrochemicals Ltd. since 1955, has resigned to take up an appointment with Constructors John Brown Ltd. He is succeeded by Dr. J. A. BERRIMAN, who joined Shell Chemical Co. Ltd. from Cambridge University in 1940 and has had experience in Shell refineries in this country and the U.S. In July 1955 Dr. Berriman was appointed director (refining division) and deputy to the managing director of Shell Refining Co.

Obituary

Mr. H. E. ROWDON, director and general manager of Cuprinol Ltd., Terminal House, Grosvenor Gardens, London S.W.1, suddenly on 1 March after a brief illness. He joined the company soon after it was formed in 1933 and served in the R.A.F. during the war. On his return he soon took a leading part in the management, being appointed general manager in 1953 and a director in 1958. Mr. Rowdon was one of the pioneers in introducing into this country solvent-type preservatives.

Mr. WILLIAM LESLIE MAURICE O'CONNOR, chairman of the Calor Gas Holding Co. Ltd., was killed when the plane he was piloting crashed at Panshanger airfield, Herts, on 4 March. Mr. O'Connor, who was 52, was formerly director of carbonisation in the National Coal Board.

Overseas News

MONTECATINI'S NEW COMPLEX TO PRODUCE 700,000 TONS PETROCHEMICALS A YEAR

FOUNDATION stone of the largest petrochemical plant of the Montecatini Co. was laid in Brindisi on 8 March. The Montecatini Group being the first to start in 1951, the chemical exploitation of hydrocarbons, have already on stream, or under construction, six petrochemical plants, among which the best known are those at Ferrara, Novara and Terni.

The new plant at Brindisi, the seventh in this series, will be the largest of the group, which will rank among the most important in Europe. It will cover an area of about 500 hectares and will employ 2,500 persons, apart from about 1,500 people occupied in parallel activities. Its production of petroleum derivatives will range to 700,000 tons per year, with a yearly supply of raw materials of about 1,300,000 tons.

Erection of the plant will require 2,000,000 working days, 50,000 tons of metallic materials, 100,000 cu. m. of concrete, and the employment of 1,300 workers. The plant will also include a thermo-electric power station, reservoirs for a total capacity of 400,000 cu. m. Power consumption is estimated at 300 million kWh per year, or 20 times the power consumption of the whole town of Brindisi. Steam consumption for the productive processes will range up to 2,000,000 tons per annum.

Production will cover polypropylene (Moplen), polythene, etc., as well as polymers for synthetic fibres, aldehydes, alcohols and organic solvents, and this in close relation to the research work started in 1954 at the Milan Polytechnic by Professor Giulio Natta, and to his discoveries in the field of stereospecific catalysis, as well as of the isotactic structure of α -olefin polymers.

Mr. Giustiniani, Montecatini's managing director, has said that this new project can be considered as crowning the work carried out at the company's research institutes in preparation for, and following Natta's discoveries.

New Wool Dyeing Process Speeds Dyeing Time

A new method of dyeing wool has been discovered by Dr. B. S. Harrap of the Division of Protein Chemistry, Commonwealth Scientific and Industrial Research Organisation, Melbourne.

Dr. Harrap described the process to members of the Society of Dyers and Colourists of Australia at a meeting on 4 March.

The method depends on treating wool top or loose wool with a cold solution of dyestuff in an organic solvent for a minute or two. Dyeing time is reduced

still further by first wetting the wool with the solvent. In normal dyeing of wool, the wool goods must be boiled in an acid solution, usually for more than an hour.

The new process requires no heating in the dyeing. However, the solvent must be recovered for re-use and this aspect is now being examined. A good deal of work still remains before the process can be applied commercially. One of its attractive features is its suitability for development as a continuous process.

Multi-Million Dollar Acid Plant for Erco at Ontario

The Electric Reduction Company of Canada Ltd., one of the Albright and Wilson group of companies, are to build new plants at a cost of several million dollars, to produce sulphuric and phosphoric acids, as well as sodium phosphates and other products, at Port Maitland, Ontario. Production should begin early in 1960. S.W. Ontario is the major market in Canada for high-analysis fertilisers, which have until now relied on large quantities of imported raw materials. The concentration of the detergent, metal finishing and food processing industries in Central Ontario makes Port Maitland the logical choice for this new Erco development. Sited at the point where Grand River enters Lake Erie, Port Maitland has excellent rail, road and deep water transport facilities.

Fertiliser Factory for Southern Rhodesia

A £150,000 factory which will produce nine granular and twelve other varieties of fertiliser is being built in Salisbury, Southern Rhodesia, by Windmill Fertilisers Rhodesia (Pvt.) Ltd. Reporting this, Barclays Bank D.C.O. states that the factory will have a capacity of at least 50,000 tons annually.

German Process for Nuclear-Grade Uranium Tetrafluoride

German patents 1,018,405 and DAS 1,037,437 held by Deutsche Gold- und Silber-Scheideanstalt (Degussa), Frankfurt, W. Germany, describe a method for the continuous production of nuclear-grade uranium tetrafluoride from uranium oxalate. Wet uranium oxalate is heated in a rotary kiln to 550°C in an atmosphere of hydrogen. After removal of all steam and carbon dioxide, hydrogen fluoride containing 25% hydrogen is passed through the kiln. A second kiln, operating under the same conditions, using exits gases from the first kiln,

boosts hydrogen fluoride utilisation to about 80% of input.

Degussa claim that water-free uranium tetrafluoride is produced in 100% yield, based on the oxalate. Advantages over production from uranium oxide are stated to be continuous operation, higher yield of tetrafluoride, faster reaction and ability to utilise wet starting material.

New 'Intermediate' For Urethane Polymers

Union Carbide, U.S., have developed a new series of Polyol polyethers which allow urethane manufacturers to prepare a broad range of pre-polymers to meet the most exacting requirements for flexible foams. These new intermediates are propylene oxide addition products of 1,2,6-hexanetriol, marketed under the trade mark, NIAX. Four polymers, varying in hydroxyl number from 42 to 240, corresponding to molecular weights from 4,000 to 700, are produced. By increasing the amount of triol in his formulations, a foam manufacturer can produce a range of foams of increasing rigidity.

Stauffer's Sulphuric Acid Sludge Regeneration Plant

To their already vast sulphuric acid sludge regeneration facilities, Stauffer Chemical Co., U.S., have just added at Hammond, Indiana, what is claimed to be the world's largest sludge regeneration plant. The new facilities are stated to enable the company to store and process a great volume of widely varying sludges. Unique methods of selection and blending combine quantities and varieties of sludge in compatible burning mixtures from which water-white sulphuric acid is recovered. Sludges treated are alcohol acid, detergent sludge and refinery sludges including high-acidity low-carbon sludge, high-carbon low-acidity sludge, spent acids.

Colombian Firm Seeks U.K. Agencies for Antibiotics

Aschner and Co., Bogota, Colombia, seek U.K. agencies for antibiotics and vitamins as well as for neutral and soda glass tubes. They believe that considerable quantities can be sold in Colombia.

Shell Chemical/U.S. Rubber Raise Polyisoprene Production

Polyisoprene, the synthetic rubber, claimed to be as tough and strong as natural rubber and just as cheap, is to be made on an increased scale by Shell Chemical Corporation, U.S., using a new process which will keep the cost down to 30 cents a pound f.o.b. Torrance, California.

This new synthetic is already being produced on a limited scale at Shell Chemical's Los Angeles plant, but capacity is expected to rise to 15,000 to 20,000 tons annually. U.S. Rubber have been using polyisoprene for truck tyres, which hitherto have always been made from natural rubber.

Commercial News

Anglo-French Phosphate

Mr. D. L. T. Oppe, chairman of the Anglo-French Phosphate Co. Ltd., stated at the annual meeting that if current negotiations, estimated to take about two months, were successful the asset value of the company's shares would be slightly in excess of 18s per share.

British Glues

British Glues and Chemicals have acquired a 50% participation in the business of Wm. Oldroyd and Sons, gelatine manufacturers, of Widnes, Lancs.

Peter Brotherhood

The one-for-two free scrip issue, foreshadowed last year by Peter Brotherhood Ltd., is proposed to be made to ordinary holders. It will involve capitalising the £275,000 fixed assets replacement reserve and £75,000 of the general reserve.

F. W. Hampshire

With a profit of £159,883 before tax of £79,269, F. W. Hampshire and Co. Ltd., manufacturing chemists, are raising their dividend from 16½% to 20% with a final of 13½% for the year ended 5 December 1958. The previous balance of £183,237 included £63,704 depreciation written back and was subject to tax of £64,087.

An allocation of £40,000 has been made to market development.

British Oxygen

Sales of British Oxygen Chemicals Ltd., a division of British Oxygen Co. Ltd. (see also *CHEMICAL AGE*, 7 March, p. 412), which were substantially increased during the year ended 30 September 1958, are now being affected by some recession in the plastics industry, reported Mr. J. S. Hutchinson, chairman. There were indications also of increased competition in world markets for this division's products. Sales and profits for next year were therefore not expected to reach last year's levels and the "tempo of future advance" might be restrained.

Odda Smelteverk were, Mr. Hutchinson stated, benefiting in Norway from additional supplies of hydro-electric power, produced and sold greater quantities of carbide, cyanamide and dicyandiamide. Improvements in operation resulting from the recent modernisation scheme, had led to much higher profits. The chairman pointed out, however, that the determination of certain countries to become self sufficient in carbide manufacture and to supply adjacent territories affected the outlook for established manufacturers such as Odda and the company could not expect last year's rate of growth to continue.

Carbide Industries Ltd., at Londonderry, were noted as working according to plan on the building of works for the manufacture of carbide from which acetylene will be supplied in due course to the adjacent Du Pont neoprene factory.

- **British Glues' Interest in Widnes Firm**
- **B.O. Chemicals Sales 'Substantially Up'**
- **Negretti & Zambra Profit Maintained**
- **Pechiney Plan to Double their Capital**

With regard to the activities of the engineering division, it is noted that the two large air separation plants at Shellhaven and Partington have now been successfully installed, and the plant for African Explosives and Chemicals Ltd. is now under construction. The division also have a £750,000 contract for supplying two 100-ton Tonnox plants for the Westfield coal gasification plant for the Scottish Gas Board.

Negretti and Zambra

Net profit of Negretti and Zambra Ltd. for the year ended 30 September was £271,053 (£267,869). A final dividend of 11%, making 15%, is proposed on ordinary. In the past 10 years turnover has risen from £650,000 to just under £1,600,000.

Pechiney

An extraordinary general meeting of the French chemical and aluminium producer Pechiney has empowered the company's board to effect a doubling of the Pechiney capital of Frs.25,990 million in one or several stages, the timing of the increase or increases in capital to be left to the discretion of the administrative board. At the meeting, the company's administrative board president, M. Raoul de Vitry, announced that between 1938 and 1958 the Pechiney production had been quadrupled. Last year, under other items, the company's out-

put of chlorine had been 75,000 tons and that of aluminium 139,000 tons. It is not to be expected that the board will effect the capital changes just yet.

NEW COMPANIES

WILLBROS (OVERSEAS) LTD. Cap. £1,000. Engineering, industrial, financial and business advisers and consultants, and gas, oil, refinery, water, electrical, mining, chemical, civil, mechanical and general engineers, contractors and constructors, etc. Directors: P. Williams, U.S., and N. Jones. Reg. office: 5 Hyde Park Place, London, W.1.

GLIDOL PRODUCTS LTD. Cap. £150. Importers, exporters, manufacturers of and dealers in chemical products, etc. Directors: O. Storm-Larsen and H. W. Holm and J. Rokk, both of Oslo. Reg. office: 27 Marchmont Road, Richmond, Surrey.

CHEMIST RESEARCH (HORTICULTURE) LTD. Cap. £100. Specialists in horticultural and agricultural research, etc. Directors: E. Pearce-Smith and E. S. Smith. Reg. office: 5 Gt. Winchester Street, London E.C.2.

FELTON COMPANY (GREAT BRITAIN) LTD. Cap. £100. Production, manufacture, purchase, sale, importing, exporting, storing and marketing of all industrial chemicals, chemical products, natural essential oils, aromatic chemicals, etc. Directors: L. L. Gefen, R. W. Stansfeld. Reg. office: Audrey House, Ely Place, London E.C.1.

Market Reports

EXPANDING DEMAND FOR FERTILISERS

LONDON There has been a steady home call for supplies in most sections of the industrial chemicals market. Contract delivery specifications have covered good quantities but new business in the main has been for spot or nearby requirements. Export activity continues on a fair scale with a steady flow of new inquiries for Commonwealth destinations. The demand for fertilisers is expanding, and from now on deliveries are likely to be under pressure.

Prices generally are held at recent levels but some of the non-ferrous metal compounds are firmer. Zinc oxide white seal is currently quoted at £100 10s, and red seal at £95 10s. per ton. Copper sulphate 98/100% is dearer at £78 per ton less 2% f.o.b. Liverpool. The convention prices of white lead, red lead and litharge continue unchanged.

MANCHESTER Quotations on the Manchester market for heavy chemical products during the past week have continued on a steady to firm basis, with a

further advance in copper sulphate reported. There is a reasonably good demand from most industrial users for deliveries under existing contracts, but fresh bookings in the home section tend to be restricted to relatively short periods. The movement on shipping account has been about maintained. Increased activity has again characterised the fertiliser section, and a quietly steady demand has been reported for most of the tar products.

GLASGOW Quite a moderate demand was maintained during most of the past week in the Scottish heavy chemical market. The emphasis was mostly on current requirements for the usual range of industrial chemicals. There was little change in the price position.

The export market continues at a good level, with a variety of inquiries being received. Business in agricultural chemicals is now showing much more activity, particularly regarding forward requirements for the coming season.

SHARPLES

offer this 7-point Service to the Pigment, Paint and Varnish Industries

All over the world, paint and varnish manufacturers are benefiting from Sharples Research and Development which has resulted in the Sharples 7-point Service.

- 1 Sharples Continuous Linseed Oil Refining Process.
- 2 Sharples Continuous Linseed Oil Degumming Process.
- 3 Sharples Vaporseal Clarifier for paint clarification.
- 4 Sharples Super-D-Canter for wet classification of pigments.
- 5 Sharples Vaporseal Clarifier for varnish clarification.
- 6 Sharples Super-Classifer for dry classification of pigments.
- 7 Sharples Super-Centrifuge for the recovery of spoiled pigmented lacquers.

*To find out more about Sharples World-wide service
write, or telephone Camberley 2601.*



SHARPLES

SHARPLES CENTRIFUGES LTD · TOWER WORKS · DOMAN ROAD · CAMBERLEY · SURREY

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 22 April

- Process for the preparation of an aqueous slurry of ground inorganic hydrophilic solids having an alkaline reaction in water. Monolith Portland Midwest Co. **812 147**
- Polymeric compositions, fibres with dyeing properties obtained from said polymers and process for the preparation thereof. Montecatini Soc. Generale Per L'Industria Mineraria e Chimica. **812 370**
- Rust preventive. Esso Research & Engineering Co. **812 149**
- Cooling and solidifying of aluminium sulphate. Sulphates Ltd. **812 265**
- Metal-containing tricyclic chelating monoazo dye-stuffs and their use. Geigy, A.G., J. R. **812 151**
- Polymerisation of di-olefins. Petrochemicals Ltd. **812 152**
- Amides of vinyl ethers containing hydroxyl groups and polymers thereof. Rohm & Haas Co. **812 158**
- Epoxide ether, polymerisation products thereof, and their preparation. Velsicol Chemical Corp. **812 374**
- Production of a matt surface upon solvent-cast film or sheeting. Celanese Corp. **812 415**
- Vessel for the low temperature storage of liquefied gases. British Oxygen Co. Ltd. **812 375**
- Dinonylnaphthalene sulphonates and process of producing same. King Organic Chemicals, Inc. **812 131**
- Regenerative process for spent aqueous alkaline solutions. Esso Research & Engineering Co. **812 377**
- Process for the manufacture of metal powders. Berk & Co. Ltd., F. W. **812 341 & 812 342**
- Supported catalysts. Distillers Co. Ltd. **812 382**
- Ceramic compositions. General Electric Co. **812 343**
- Purification of gases. Gas Council. **812 428**
- Polymerisation process and catalyst therefor. Phillips Petroleum Co. **812 165**
- Apparatus for the continuous physical and/or chemical treatment of substances. Willem, P. **812 292**
- Free-flowing rosin materials. G. & A. Laboratories, Inc. **812 166**
- Flaw prevention in P-type crystals. Clevite Corp. **812 173**
- Copolymers. Esso Research & Engineering Co. **812 388**
- Polymeric phosphate esters and their production. Union Carbide Corp. **812 390**
- Production of polymers. Imperial Chemical Industries Ltd. **812 176**
- Esters. Geigy, A. G., J. R. **812 177**
- Process for treating ores. Diamond, G. S. **812 178**
- Feedstock for cracking and other liquid hydrocarbons. Imperial Chemical Industries Ltd. **812 392**

- Odour removal and stabilisation of phosphate-containing pesticides. American Cyanamid Co. **812 182**
- Recovery of krypton and xenon from air. British Oxygen Co. Ltd. **812 397**
- Cleaning mineral spirits. Aluminium Laboratories Ltd. **812 187**
- Disposal of pulp mill effluent and other aqueous liquids containing non-volatile oxidisable components. Courtaulds Ltd. **812 438**
- Apparatus for degassing liquid metal. Dortmund-Hörder Hüttenunion A.G. **812 445**
- Disinfectants. Newby, H. (Chemische Werke Hüls A.G.). **812 446**
- Production of 1:2-diphenyl-4-N-butyl-3:5-dioxo-pyrazolidine. Geigy A.G., J. R. **812 449**
- Method of and apparatus for roasting sulphidic materials in multi-hearth furnaces. Metallgesellschaft A.G. [Addition to 790 539.] **812 199**
- Coating metals. Diffusion Alloys Ltd. **812 391**
- Quaternary ammonium salts. Allen & Hanbury Ltd. **812 457**
- Processes for increasing the wettability of nylon. Ions Exchange & Chemical Corp. **812 460**
- Manufacture of natural and synthetic rubbers and rubber articles. Imperial Chemical Industries Ltd. **812 467**
- Dielectric films of thermoplastic polymers. Du Pont De Nemours & Co., E. I. **812 470**
- Lubricating compositions. Institut Français Du Pétrole Des Carburants et Lubrifiants. **812 261**
- Nitro-phenylene diamines and their use in dyeing animal fibres. Soc. Monsanto-L'Oreal. **812 211**
- Lubricating composition. Esso Research & Engineering Co. **812 213**
- Electrically conductive compositions. Diamond Alkali Co. **812 304**
- Manufacture of carotenoids. Hoffmann-La Roche & Co. A.G., F. **812 267**
- Dyeing and printing of textile materials of polymers of acrylonitrile. Farbenfabriken Bayer A.G. **812 227**
- Clarification of aqueous organic suspensions. Dow Chemical Co. **812 228**
- Preparation of ethyldine malodinitrile and production of copolymers thereof. Farbenfabriken Bayer A.G. **812 240**
- Gas filtering apparatus. Metals Disintegrating Co., Inc. **812 244**
- Substituted benzoic acid and salts and esters thereof. Upjohn Co. **812 245**
- Detergent compositions. Hedley & Co. Ltd., T. **812 249**
- Organosilicon compounds. Midland Silicones Ltd. **812 252**
- Rolling magnesium alloy. Dow Chemical Co. **812 253**
- Derivatives of 2, 2'-isopropylidene bis (p-phenyleneoxy)-dialkanols. United States Rubber Co. **812 255**
- Carbamic acid ester having a sedative effect and methods for the preparation thereof. Kali-Chemie A.G. **812 256**
- Apparatus for the solidification of aluminium sulphate in nodular form. Sulphates Ltd. [Divided out of 812 265.] **812 266**
- Unsaturated hydrocarbon and a process for the manufacture thereof. Hoffmann-La Roche & Co. A.G., F. [Divided out of 812 267.] **812 268**
- C₆₀ diols and a process for the manufacture of same. Hoffmann-La Roche & Co. A.G., F. [Divided out of 812 267.] **812 269**

Open to public inspection 29 April

- Activated uranium dioxide and processes of producing same. Polissar, M. J. **812 791**
- Process for producing uranium tetrachloride. McCombie, H. R., and Wagner, E. L. **812 792**
- Method of recovering uranium. Kamen, M. D., and Haan, A. De. **812 793 & 812 794**
- Method of irradiating substances by neutrons. Reid, C. **812 681**

DIARY DATES

MONDAY 16 MARCH

- Inst. Plant Eng.—Chester: The Blossoms, 7.15 p.m. Branch A.G.M. and film, 'Planned for the purpose'.
- Inst. Metal Finishing—London: Northampton Coll., St. John St., E.C.1, 6.15 p.m. 'Hydrogen content of electro-deposits', by Prof. Ernst Raub.
- S.C.I.—London: 14 Belgrave Sq., S.W.1, 5.30 p.m. 'Problems of Stomoxys research in E. Africa', by Mr. J. E. H. Grose and Mr. H. C. M. Parr.

TUESDAY 17 MARCH

- I.Chem.E.—London: Church House, S.W.1, 9.30 a.m. Spring meeting.
- Oil and Colour Chem. Assn. (also 18 and 19 March)—London: R.H.S. New Hall, S.W.1. Eleventh technical exhibition.

WEDNESDAY 18 MARCH

- C.S.—Dublin: Trinity Coll., 7.45 p.m. 'Amine oxidation', by Prof. H. B. Henbest.
- C.S. with R.I.C.—Newcastle: King's Coll., 6.30 p.m. 'Polyethers', by Prof. G. Gee.
- Inst. Fuel—Leeds: Metropole Hotel, 2.30 p.m. 'Effluent gas cleaning', by Mr. E. L. Brown.
- Inst. Plant Eng.—Rooster: King's Head, 7 p.m. 'Some applications of plastics in industry', by Dr. C. L. Child (I.C.I.).
- R.I.C. with Classical Assn. and Haldane Soc.—London: Senate House, Univ., W.C.1, 5.30 p.m. Debate 'That the education of our future rulers should be primarily in the sciences rather than in the humanities'.
- R.S.A.—London: John Adam St., Adelphi, 2.30 p.m. 'Pollution of the Thames estuary', by Dr. B. A. Southgate.
- S.A.C.—Glasgow: Central Hotel, 7.15 p.m. 'The estimation of digestible carbohydrates in poultry foods', by Dr. W. Bolton; and 'A review of "rapid methods" of silicate analysis', by Dr. E. L. P. Mercer.
- S.C.I. with C.S. and R.I.C.—Belfast: Univ., 7.15 p.m. 'Neoprene—a versatile synthetic rubber', by Dr. J. N. Milne.
- S.C.I. with R.I.C.—Newport, Mon.: Tech. Coll., 7 p.m. Films 'The Vineyards and Wines of France' and 'Packaged Power'.
- S.C.I. with R.I.C.—Norwich: City Coll., 'Chromatography as an analytical tool', by Dr. I. Smith.
- S.C.I.—London: 14 Belgrave Sq., 6.30 p.m. 'Economic aspects of corrosion', by Mr. A. Keynes.

THURSDAY 19 MARCH

- Royal Stat. Soc.—Bristol: Univ., 5.45 p.m. 'The economics of routine testing in a chemical factory', by Dr. O. L. Davies.
- Royal Soc.—London: Burlington House, 4.30 p.m. 'The atomisation of hydrogen on tungsten', by Mr. D. Brennan and Mr. P. C. Fletcher; 'Sedimentation and electrophoresis of interacting substances', by Mr. G. A. Gilbert.
- S.C.I.—Edinburgh: Visit to research laboratories of National Coal Board, 7.30 p.m.
- S.C.I.—Grangemouth: B.P. refinery, 7 p.m. A.G.M., Stirlingshire section. With R.I.C. and Inst. Petroleum at 7.30 p.m., 'Oil searching in the U.K.'.
- S.C.I.—Lancaster: Coll. of Further Educ., 7.30 p.m. 'Photography in scientific investigations', by Dr. H. Hirsch.
- S.C.I.—London: 14 Belgrave Sq., S.W.1, 6 p.m. 'Slag for roadmaking', by Mr. D. A. Dowdeswell.
- S.C.I. (also 20 March)—London: Beveridge Hall, Univ., W.C.1. Symposium on 'Costing in the chemical industry'.
- S.C.I.—Nottingham: Tech. Coll., 7.30 p.m. 'The extraction of thorium', by Mr. W. D. Jamrack, Mr. R. A. Wells and Dr. J. H. Buddery.

FRIDAY 20 MARCH

- C.S. with R.I.C.—Sheffield: City Memorial Hall, 7.30 p.m. 'Colour', by Dr. E. Averton.
- S.A.C.—Birmingham: Univ., 6.30 p.m. 'X-ray fluorescence', by Mr. J. R. Stansfield and Mr. H. I. Shalagovsky.
- S.C.I. with R.I.C.—Seascale: Windscale Club, 8.15 p.m. 'Some recent industrial applications of organometallic compounds', by Mr. R. Sidlow.
- Soc. for Water Treatment—London: Ryl. Soc. Health, 90 Buckingham Palace Road, S.W.1, 9.30 a.m. A.G.M., followed by papers.



"VULCAN" IRON AND STEEL CARBOY HAMPERS
SAFETY CRATES, PACKED CARBOYS
HARRIS (LOSTOCK GRALAM) LTD.
LOSTOCK GRALAM, NORTHWICH, CHESHIRE.

TRADE NOTES

Ashmore/Mond Nickel Agreement

Ashmore, Benson, Pease and Co. Ltd. have informed us that they have recently concluded a licence arrangement with the Mond Nickel Co. Ltd. by which they are now in a position to supply S.G. or high ductile iron castings in accordance with British Standard Specification 2789/1956.

As is well known, Ashmore's, for 25 years, have offered high-duty iron castings made by the Meehanite process for a wide range of engineering applications and under the new arrangements they will be able to extend their foundry services even further by supplying grey iron, Meehanite iron and spheroidal graphite iron castings in weights up to 25 tons in floor, loam, machine moulded and CO₂ moulded castings.

New Uses for Waxes

As part of the technical service of the B.B.G. Group of Companies, industrial technical bulletins indicating new uses for waxes in industry are available from Division D, Bush, Beach and Gent Ltd., Marlow House, Lloyds, Avenue, London E.C.3.

Chemicals in 1 Kg. Containers

British Drug Houses Ltd., Poole, Dorset, have published a price list of laboratory chemicals now available in 1 kg. containers, in addition to the package sizes appearing in their catalogue.

They also announce that they are making no charge for ordinary corked or capped bottles of a nominal capacity up to 900 ml. or 32 fl. oz., which will be regarded as being on loan.

Further Platinum Price Increase

Johnson Matthey Ltd. announce that as from 6 March the price for their platinum has been increased by £3 10s to £28 10s an ounce. The Baker Platinum division of Engelhard Industries have also increased their price of platinum by the same amount. Both companies are reported as having experienced a good demand for supplies of platinum recently.

Rigidex Price Reduced

The price of 'Rigidex polyethylene' has been reduced by between 2d and 3d per lb., depending on quantity and colour. For lots of between 1 and 5 tons Rigidex natural is now 3s 3d per lb. (formerly 3s 6d), and standard colours are 3s 7½d (3s 9½d). In addition a price schedule has been introduced for standard black, which is 3s 6d per lb. for 1-5 ton lots. Full details of the price changes are available from British Resin Products Ltd., Devonshire House, Piccadilly, London W.1.

Nitrate Co.'s Agents

Compania Salitrera Anglo-Lautaro (Anglo-Lautaro Nitrate Corporation) have closed their London office. Nitrate Corporation of Chile, 20-24 Ropemaker Street, London E.C., will act as their agents.

Catalogue in Norwegian

Tenth overseas version of the general catalogue of Negretti and Zambra Ltd.,

122 Regent Street, London W.1, has been published in Norwegian. It is hoped to publish a Portuguese edition in time for the Lisbon Trade Fair at the end of May. Also available is publication S109 dealing with the company's overseas sales and service facilities.

Sole Agents for German Firm

Ankerwerk Gebr. Goller of Nuernberg, manufacturers of injection moulding machines, have appointed Hamilton Machinery Sales Ltd., 32 Buckingham Palace Road, London S.W.1, as their sole agents for the U.K.

Expansion in Ankerwerk's range of machines has caused them to reorganise their sales and service facilities in the U.K.

Price Cut for Carbodrip

Wild-Barfield Furnaces Ltd., Watford, Herts, announce a reduction in price of their patented Carbodrip gas-carburising fluid in the U.K. as from 9 March. This reduction follows a fall in the cost of raw materials and will result in greater savings in operating costs by users of Carbodrip in drip-feed gas-carburising furnaces.

Electronic Process Timers

Elcontrol, Wilbury Way, Hitchin, Herts, have issued a revised data sheet TR, issue 2, describing their range of standard electronic process timers, cyclic timers and delay switches. They have simplified the descriptions of the three types of timers, as well as presenting information regarding their characteristics in a tabular form. The company's interest in producing complete sequence control panels to meet specific requirements is emphasised.

New Telephone Number

The telephone number of the London office of Clayton, Son and Co. Ltd., the Hunslet engineering firm, at 17 Wallace Fields, Epsom, Surrey, is now Ewell 9052.

Head Office Move

Houseman and Thompson Ltd., water treatment specialists and chemical engineers, are to move their head office from Newcastle-on-Tyne to Buckinghamshire.

Mr. B. G. Houseman, chairman, said that the development of the company's business in recent years had made a move nearer to London inevitable. The company will retain their research laboratories and depot at Willington Quay.

Sack With Controlled Flow-rate

A multiwall sack with an opening which can be varied in size, can be closed if all the contents are not to be used at once, and from which the rate of flow can be controlled, has been developed by Bowater-Eburite Bulk Packaging Ltd., Multiwall Sack Division, Ellesmere Port, Cheshire.

The floor of the external tuck-in valve may be removed to provide a pouring orifice permitting these operations. This adds considerably to the ease with which the sack and its contents can be handled.

MAPAC polythene bags & liners

MARK ANTHONY & SONS LTD

MAKE
TO CUSTOMER
SPECIFICATION
IMPERMEABLE ACIDPROOF
STRAIGHT-SEALED OR
BLOCK-BOTTOMED DRUM,
TIN, KEG, CASE & SACK
LINERS

MACHINE COVERS
SHIPPING BAGS
SAMPLING BAGS

PRINTING
A SPECIALITY

ENQUIRE
ABOUT OUR
STOCKHOLDING CALL-OFF
SERVICE

Please note our new
Telephone No.
WATFORD 24477/8

MARK ANTHONY & SONS LTD
Mapac Works, Watford, Herts

INDUSTRIAL WILKINSON CHEMICALS

Specialists in the Production of

- FLUORINE COMPOUNDS
- HYDROFLUORIC ACIDS
- ANALYTICAL REAGENT ACIDS

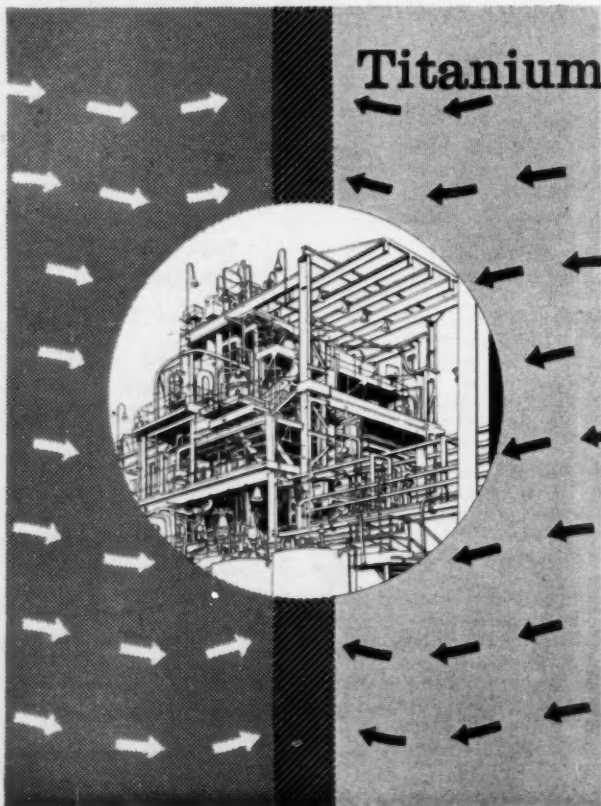
James Wilkinson & Son Ltd

TINSLEY PARK ROAD · SHEFFIELD 9
TELEPHONE 41208 (3 LINES) 'GRAMS: CHEMICALS, SHEFFIELD 9

LONDON AGENTS & DISTRIBUTORS

JOSEPH WEIL & SON LTD., FRIARS HOUSE,
39-41 NEW BROAD STREET LONDON, E.C.2.

Titanium in chemical plant



Titanium and titanium alloys can withstand attack by a wide variety of aggressive chemicals, including chlorine, chlorite and hypochlorite solutions, nitric acid, chromic acid, metallic chlorides, sulphides and organic acids. They are thus ideally suited for the construction of plant handling these compounds. Moreover, they can be readily fabricated by techniques broadly similar to those applied to more conventional materials.

I.C.I. Metals Division supplies titanium and a range of titanium alloys in all normal wrought forms — sheet, strip, bar, rod, tube, wire, plate, billet and forging stock.

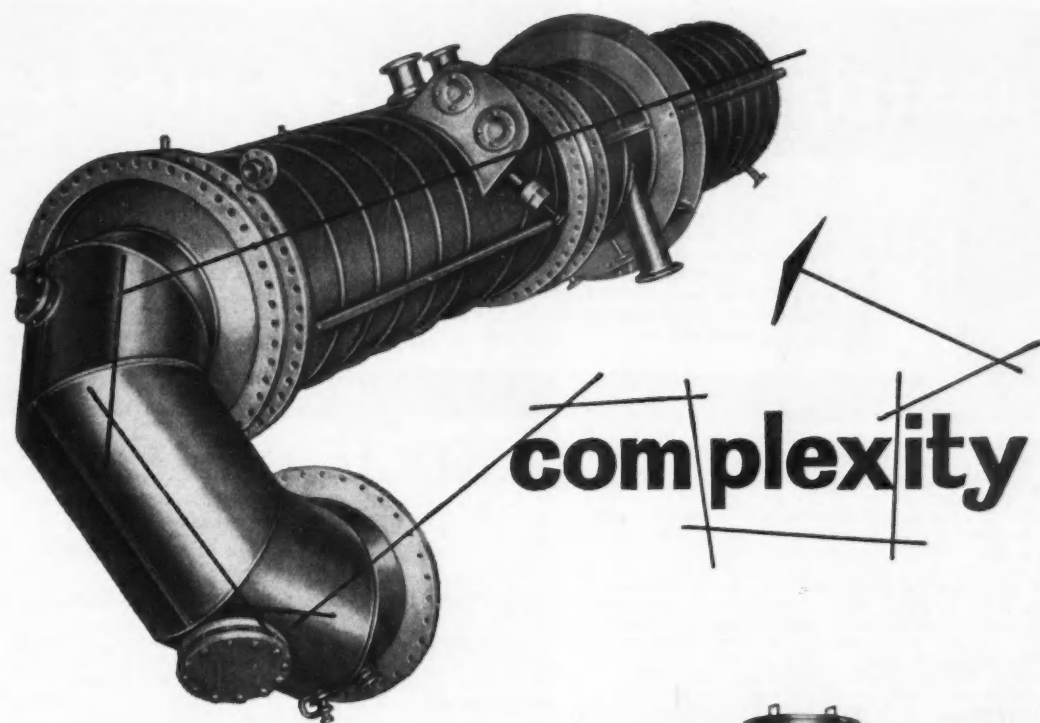
now is the time to think

I.C.I. Titanium

IMPERIAL CHEMICAL INDUSTRIES
LIMITED, LONDON, S.W.1



TM 125



complexity



simplicity

... but each executed with the
same precision vital to
high grade chemical engineering
plant and which can always be
found in work carried out by
Burnett and Rolfe Limited.



DESIGN AND CONSTRUCTION TO BRITISH, AMERICAN CODES AND LLOYD'S



BURNETT & ROLFE LIMITED

THE ESPLANADE · ROCHESTER · KENT. Tel: CHATHAM 41766

NORTHERN OFFICE: 32 Deansgate, Manchester. Tel: Blackfriars 9084

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to 10 a.m. Tuesday for insertion same week.
SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.
SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of CHEMICAL AGE DIRECTORY AND WHO'S WHO.
COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

EDUCATIONAL

A.M.I.CHEM.E.—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng., A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—FREE. T.I.G.B. (Dept. 84), 29 Wright's Lane, London, W.8.

FOR SALE

Brand New **COCHRAN** Vertical and **ECONOMIC** Self-contained **STEAM BOILERS** in stock, also all sizes reconditioned and guaranteed. List on request.

STAINLESS STEEL TANKS, PANS, CONDENSERS, PLATES, VALVES AND COCKS. Very wide selection.

80 gall. S.S. Jacketed Mining Pan, tilting type.

Ten new enamel-lined **ENCLOSED TANKS**, 150/1,000 galls.

FRED WATKINS (ENGINEERING) LTD.,
COLEFORD, GLOS.

Phone: Coleford 2271/2

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS,** **BOW COMMON LANE, LONDON, E.3 (TELEPHONE: EAST 3285).**

Motor-driven 24-in. **AIRSCREW BLOWERS**—4 in. delivery, mounted on channel frame coupled to $\frac{1}{2}$ h.p. motor 230/250 volts, 3-phase, 50 cycles.
 New condition. £20-0-0 to clear.

THOMPSON & SON (MILLWALL) LTD.,
CUBA STREET, MILLWALL,
LONDON, E.14.
 Tel.: EAST 1844.

PHONE 98 STAINES

(12) S.S. (UNUSED) **JACKETED PANS**—20 in. by 17 in.

Glass-lined Tanks—800, 1,500 and 1,800 gal.

42 in. Electric Under-drive Hydro—440/3/50.

(9) 750-gal. S.S. Tanks—7 ft. by 3 ft. 3 in.

"**JOHNSON**" **FILTER PRESS**—48—36 in. sq. plates. Ditto, 24—25 in. sq. plates.

"Pair" Heavy "U"-Trough Mixers—5 ft. by 2 ft. 3 in. by 2 ft. 6 in. 10 h.p. A.C.

Tanks of all types up to 26,500 gallons.

Pumps, Autoclaves, Condensers, Ovens, etc.

Send for Lists.

HARRY H. GARDAM & CO. LTD.,
100 CHURCH STREET, STAINES.

FOR SALE: continued

MORTON, SON AND WARD LIMITED

offer

STAINLESS STEEL VESSELS

One **TANK** 10 ft. by 2 ft. 6 in. dia. totally enclosed, suitable for 20 lb. p.s.i. w.p.

One **CRYSTALLIZING PAN** 4 ft. dia. by 1 ft. 6 in. deep, detachable lid, with or without jacket.

Several s.s. **COILS** from 2 ft. to 7 ft. dia.

Assortment of s.s. **VALVES, PLUG COCKS** etc., from $\frac{1}{2}$ in. to 3 in.

Quantity of s.s. **TUBING** and s.s. **FLANGES.**

All above second hand and in good condition.

NEW UNITS in stainless or mild steel made to requirements.

CONDENSERS,

MIXING VESSELS, JACKETED PANS with or without mixing gear.

"**MORWARD**" "U" shaped **TROUGH MIXERS** with or without jackets.

TANKS, CYLINDERS, RECEIVERS, PRESSURE VESSELS and **AUTOCLAVES.**

Stirring gear can be fitted to any vessels.

New **PORTABLE STIRRING UNITS** with clamp-on attachment to requirements.

New **MONO** pumps and other second hand **PUMPS** in stock.

Enquiries invited:

MORTON, SON AND WARD LIMITED,
DOBCROSS, OLDHAM,
Lancs.

Phone Saddleworth 437

Unused Stainless Steel "**Z**" **MIXER**—21 in. by 21 in. by 20 in. Jacketed 50 lb. p.s.i. w.p. Glanded. With reduction gear.

Unused Gardner 4 ft. dia. Double-Cone **MIXER**—20 cu. ft. 5 h.p. T.E. Motor and brake.

Baker-Perkins "**Z**" **MIXER** 53 in. by 43 in. by 32 in., Electric Tilting, 12 $\frac{1}{2}$ H.P. A.C. Motor with Speed Reducer.

Hobart 80-qt. (4-speed) and 30-qt. (3-speed) **ELECTRIC CAKE MIXERS.**

REVOLVING DRUM MIXER—6 ft. by 2 ft. 4 in. wide.

Stainless Steel 450-gal. **F.M.B. TANK**—5 ft. by 4 ft. New condition. Available March.

Seite Aluminium **FILTER PRESS**, Beer type—4 chambers 15 in. square on wheeled trolley.

Lying at our No. 2 Depot, Willow Tree Works, Swallowfield, Berkshire.

Apply:

WINKWORTH MACHINERY LTD.,
65 HIGH STREET
STAINES, MIDDLESEX.
 (Telephone 1010)

By order of Messrs. Ross (Gelatines) Ltd.

FIRTH ROAD, LINCOLN

HENRY BUTCHER & CO.

are instructed to offer for SALE BY AUCTION
at THE WORKS on

Wednesday, 29th April, 1959
at ELEVEN A.M.

As a **FIRST LOT**

THE RAILSIDE FREEHOLD FACTORY & LAND

covering a
GROUND AREA OF 5½ ACRES
EXTENSIVE ROAD AND RIVER FRONTAGES
with

Substantial Mainly Single Storey Buildings
FLOOR SPACE 90,000 SQ. FT.

All Main Services Effluent Disposal System
"RUSTON" THERMAX BOILER PLANT for Process and
Space Heating
Land for extensions

To be followed by the Sale in Lots in detail of the

Plant, Machinery and Equipment

including

"MIRRELES WATSON" GELATINE EVAPORATION
PLANTS

"SANVIC" 32 in. S.S. BAND COOLER CONVEYOR
PADDLE WASHERS

TANKS AND VATS (some Lithocote lined)
RIVETED STEEL EXTRACTION PANS

"SANVIC" 30 in. S.S. CONTINUOUS BAND SETTER
FILTER PRESSES PUMPS

"KEITH BLACKMAN" FANS ELECTRIC MOTORS
AIR COMPRESSORS

4,000 ALUMINIUM AND STEEL DRYING FRAMES
Welding Equipment Portable Electric Tools Shafting
Piping Weighing Machines Bogies Trucks

WOODWORKING MACHINERY

"HARRISON CARTER" GRINDERS

"CHRISTY NORRIS" GRINDERS AND SCREENERS
Coal Elevators and Conveyors Water Softening Plant Tanks

LANCASHIRE STEAM BOILERS 30 ft. x 8 ins.
and 22 ft. x 8 ft.

"PECKETT" MODEL M.5 S.G. LOCOMOTIVE
"STEELS" 2-TON ELECTRIC EEL

"COLES" MODEL S.47. 3-TON DIESEL CRANE
LABORATORY EQUIPMENT AND
OFFICE FURNITURE

Combined Particulars of the Property and Catalogues of the Plant,
Machinery and Equipment, price 6d. each, may be obtained of:—
Messrs. HERBERT SMITH & CO., Solicitors, 62, London Wall,
London, E.C.2; or of Messrs. HENRY BUTCHER & CO.,
Auctioneers, Valuers and Surveyors of Factories, Plant and
Equipment, 73, Chancery Lane, London, W.C.2.

Telephone: HOLborn 8411 (8 lines).

OFFICIAL APPOINTMENTS

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD:
SENIOR SCIENTIFIC OFFICERS. 1 post at Harpenden for
Organic or Analytical Chemist, preferably with experience of plant
protection chemistry, to act as Secretary to a crop protection
committee. The duties involve some administrative work and
some travelling.

1 post at Aberdeen for a Physical Chemist, preferably with
experience in reaction Kinetics or radiation chemistry.

Both posts are pensionable, and require 1st or 2nd class honours
degree in chemistry with at least 3 years' post-graduate experience.
Men and women aged at least 26 and under 31 (with extension for
Forces and Overseas Civil Service) may apply. Men's salary scale
£1,200 (or higher in exceptional cases)—£1,420 in Aberdeen, £30
less in Harpenden. Write Civil Service Commission, 17 North
Audley Street, London, W.1, for application form quoting S.53/59.

SITUATIONS VACANT

LARGE COMPANY requires man aged 30/35 with considerable
experience of commercial buying and selling of Petroleum and
General Chemicals. Knowledge of Export Trade would be an
advantage. Good salary, pension. **Box No. 3651.**

UNIVERSITY COLLEGE OF NORTH STAFFORDSHIRE U.S. RUBBER CO. POSTGRADUATE RESEARCH STUDENTSHIP

Applicants for this Studentship should have a good Honours
Degree including Chemistry. The successful applicant will be
expected to read for a higher degree working on cationic poly-
merisation under Dr. P. H. Plesch. Stipend not less than £400 p.a.
Applications from this year's graduates and from chemists in
industry or abroad are welcome. Applicants should send a brief
curriculum vitae and names of two referees to the Registrar, The
College, Keele, Staffs., England, not later than 4th April, 1959.

WANTED

INDUSTRIAL BY-PRODUCTS LTD., 16 Philpot Lane, London,
E.C.3, will be pleased to receive particulars of any by-products,
waste materials and residues for disposal.

WANTED secondhand 5 or 10 gallon polythene carboys
Communicate **Box No. 3652**

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade
THE CRACK PULVERISING MILLS LTD.

Plantation House,
Mincing Lane,
London, E.C.2

High grade Corrosion Resistant Plastic Pipes and Fittings, Special
Fabrications, Mouldings and Plastic Valves. Expansion Units
and Thread Cutting Tools.

BARFLO

56, Cavendish Place, Eastbourne.
(Telephone 4046/7)

**PAPER BAGS
POCKETS
COUNTER ROLLS**

**STONEHOUSE
PAPER & BAG MILLS
STONEHOUSE, GLOS.**

*Have YOU an
EFFLUENT
problem?*

If you have an EFFLUENT or SEWAGE TREATMENT problem we can be of assistance. We are Manufacturers of ALUMINIUM SULPHATE—the use of which is frequently an essential step in the process of producing a satisfactory liquid effluent. May we examine your present effluent and offer our advice?

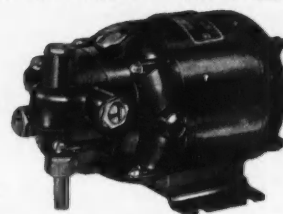
THE **ALUMINA** CO. LTD.
IRON BRIDGE WORKS
WIDNES. LANCs.

PHONE
WIDNES
2275



WORLD FAMOUS FRACTIONAL HORSE-POWER GEARED MOTORS

Output-shaft has 12 positions.
Integral Wormgear Reduction
Ventilated—Drip Proof.
Vacuum Impregnated Windings.
Dynamically balanced Armatures and Rotors.



SERIES WOUND GEARED MOTOR—Type 'K'

R.P.M.	TORQUE	R.P.M.	TORQUE
600	10 oz. in.	37.5	4 lb. in.
300	16 oz. in.	25	4 lb. in.
150	24 oz. in.	18.8	4 lb. in.
100	32 oz. in.	12.5	4 lb. in.
75	36 oz. in.	9.4	4 lb. in.
50	3 lb. in.	6.25	4 lb. in.

SHADED-POLE INDUCTION GEARED MOTOR—Type 'FA'

R.P.M.	TORQUE	R.P.M.	TORQUE
216	4 oz. in.	13.5	24 oz. in.
108	7 oz. in.	9	30 oz. in.
54	10 oz. in.	6.7	35 oz. in.
36	12 oz. in.	4.5	44 oz. in.
27	15 oz. in.	3.35	3 lb. in.
18	20 oz. in.	2.25	4 lb. in.

VARIABLE SPEED GEARED MOTOR—Type 'KQ'

R.P.M.	TORQUE	R.P.M.	TORQUE
200-600	9 oz. in.	12-37.5	4 lb. in.
100-300	16 oz. in.	8-22	4 lb. in.
50-150	20 oz. in.	6-16.5	4 lb. in.
32-100	32 oz. in.	4-11	4 lb. in.
25-75	40 oz. in.	3-8.25	4 lb. in.
16-50	48 oz. in.	2-5.5	4 lb. in.

CAPACITOR INDUCTION GEARED MOTOR—Type 'N'

R.P.M.	TORQUE	R.P.M.	TORQUE
456	8 oz. in.	28.5	3 lb. in.
228	13 oz. in.	19	4 lb. in.
114	21 oz. in.	14.2	4 lb. in.
76	26 oz. in.	9.5	4 lb. in.
57	32 oz. in.	7.1	4 lb. in.
38	44 oz. in.	4.75	4 lb. in.

CITY ENGINEERING CO. (Boreham Wood) LTD.

(Dept. CA58)

MANOR WAY · BOREHAM WOOD · HERTS · ENGLAND

Telegrams: Citenco Borehamwood. Telephone: Elstree 3666-7-8

Classified Advertisement Order Form

To The Manager
CHEMICAL AGE
Bouverie House
Fleet Street, London E.C.4

Please insert the following in your next issue and for.....
weeks thereafter Date.....

SITUATIONS VACANT

OFFICIAL APPOINTMENTS

FOR SALE

AUCTIONEERS, VALUERS, etc.

EDUCATIONAL

WANTED

INVITATION TO TENDER

PATENTS

WORK WANTED AND OFFERED

CLASSIFIED RATES All sections 5d. per word. Minimum 8/- . Three or more insertions 4d. per word. Box Number 2/- extra. Up to 10 a.m. Tuesday for insertion same week.

SEMI-DISPLAY 30/- per inch. Three or more insertions 25/- per inch.

Name

Address

Chemical Age Enquiry Service

For fuller details of equipment, apparatus, chemicals etc., in the advertisement or editorial pages of Chemical Age, fill in the coupons below, ONE PER ENQUIRY, and return to us.

<p><i>Please send further details about.....</i> <i>mentioned on page.....of this issue.</i> <i>Name..... Position.....</i> <i>Firm.....</i> <i>Address</i> Chemical Age Enquiry Service.</p>
<p><i>Please send further details about.....</i> <i>mentioned on page.....of this issue.</i> <i>Name..... Position.....</i> <i>Firm.....</i> <i>Address</i> Chemical Age Enquiry Service.</p>
<p><i>Please send further details about.....</i> <i>mentioned on page.....of this issue.</i> <i>Name..... Position.....</i> <i>Firm.....</i> <i>Address</i> Chemical Age Enquiry Service.</p>

★ *Detach this page complete then fold as marked overleaf to use the post-paid reply folder*

CUT ALONG THIS DOTTED LINE

2nd FOLD

Postage will be paid by the Licensee

No Postage Stamp necessary if posted in Great Britain or Northern Ireland

BUSINESS REPLY FOLDER
Licence No. 2501

CHEMICAL AGE
154-160 FLEET STREET
LONDON, E.C.4

1st FOLD

3rd FOLD

Chemical Age

ENQUIRY SERVICE



☞ This is a special service for readers of

CHEMICAL AGE

☞ It is designed to give fuller information on equipment, apparatus, chemicals etc., mentioned in this issue—whether in the editorial text or in an advertisement

☞ Cut out the whole of this page, fold as instructed with post-paid address on the outside



Chemical Age

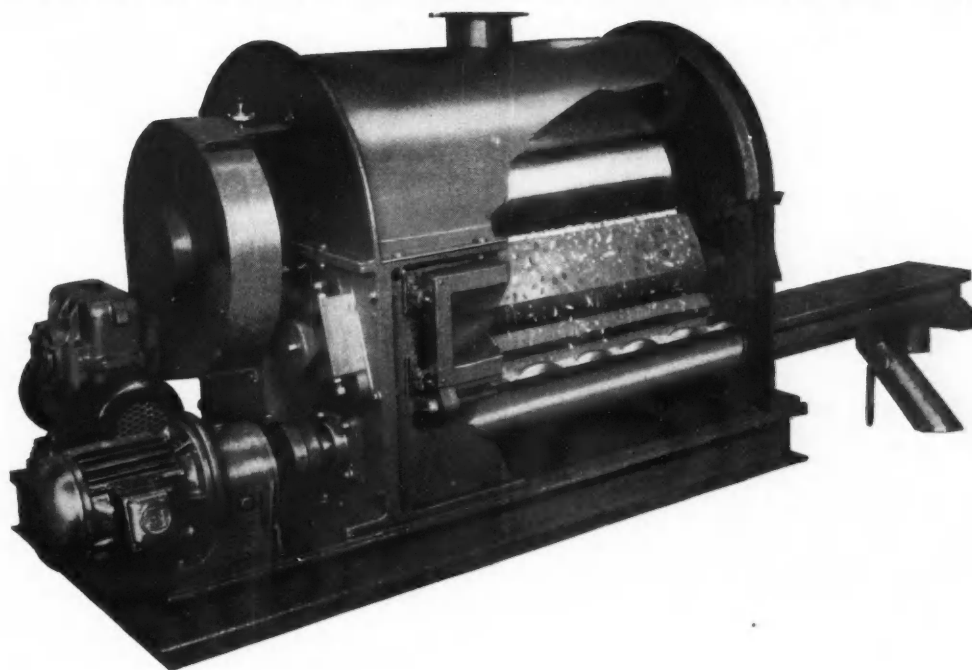
154 Fleet Street, London, E.C.4

Tel.: Fleet Street 3212

SIMON

P A T E N T

COOLING & FLAKING MACHINE



In constant production in a large number of sizes ranging from 8" dia. x 8" long to 42" dia. x 108" long. Rolls are constructed of cast iron, chromed cast iron, nickel iron, stainless steel, phosphor bronze, etc.

Machines have been supplied to leading chemical manufacturers at home and abroad for flaking such materials as naphthalene, phthalic anhydride, carbamite, stearines, waxes, etc., etc.

Test machines are available at these Works, and experiments are carried out on customers' materials without charge or engagement.

RICHARD SIMON & SONS, LTD.
PHOENIX WORKS · BASFORD · NOTTINGHAM

Telephone: 75136-7-8

Telegrams: Balance, Nottingham

SPECIALISTS IN DRYING PLANTS AND AUTOMATIC WEIGHING MACHINERY FOR OVER 60 YEARS

*....make your product
sell itself....*



Rheemcote

..... Steel Containers
can be lithographed
with your own design in
any number of colours.

Enquiries to:...

RHEEM LYSAGHT LIMITED

ST. VINCENT'S WORKS, BRISTOL, 2

TELEPHONE BRISTOL 77601 : TELEGRAMS LYSAGHT BRISTOL

